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# TRANSACTIONS

OF THE

# COLLEGE OF PHYSICIANS

# OF PHILADELPHIA.

VOLUME THE NINETEENTH.

Med.

# TRANSACTIONS

OF THE

# COLLEGE OF PHYSICIANS

OF

# PHILADELPHIA.

THIRD SERIES.

VOLUME THE TWELFTH.

238579
14/12/29.

PHILADELPHIA:
PRINTED FOR THE COLLEGE.
1890.

# NOTICE.

The present volume of Transactions contains the papers read before the College from January, 1890, to December, 1890, inclusive.

The Committee of Publication thinks it proper to say that the Committee holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its Transactions.

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[Volume XII. of the Transactions has been edited by Dr. J. P. Crozer Griffith.]

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## 1890.
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OF THE

## PRESIDENTS OF THE COLLEGE FROM THE TIME OF ITS INSTITUTION.

---

ELECTED

1787. JOHN REDMAN, M.D.

1805. WILLIAM SHIPPEN, M.D.

1809. ADAM KUHN, M.D.

1818. THOMAS PARKE, M.D.

1835. THOMAS C. JAMES, M.D.

1835. THOMAS T. HEWSON, M.D.

1848. GEORGE B. WOOD, M.D., LL.D.

1879. W. S. W. RUSCHENBERGER, M.D.

1883. ALFRED STILLÉ, M.D., LL.D.

1884. SAMUEL LEWIS, M.D.

1884. J. M. DA COSTA, M.D., LL.D.

1886. S. WEIR MITCHELL, M.D., LL.D.

1889. D. HAYES AGNEW, M.D., LL.D.

# FELLOWS

OF THE

# COLLEGE OF PHYSICIANS OF PHILADELPHIA.

DECEMBER, 1890.

[Non-resident Fellows are marked (*).]

ELECTED

1883. ABBOT, GRIFFITH E., Ph.D., M.D.

1870. ADLER, JOHN M., M.D.

1859. AGNEW, D. HAYES, M.D., LL.D. (Emeritus) Professor of Surgery in the University of Pennsylvania; Consulting Surgeon to the Orthopædic, the Maternity, and St. Christopher's Hospitals.

1876. ALISON, ROBERT H., M.D.

1867. ALLEN, HARRISON, M.D., Emeritus Professor of Physiology in the University of Pennsylvania.

1873. ALLIS, OSCAR H., M.D., Clinical Lecturer on Orthopædic Surgery in the Jefferson Medical College and Surgeon to the Hospital of the same; Surgeon to the Presbyterian Hospital.

1888. ANDERS, JAMES M., M.D., Professor of Hygiene and Clinical Diseases of Children in the Medico-Chirurgical College, Philadelphia; Physician to the Philadelphia Hospital.

1869. ANDREWS, T. HOLLINGSWORTH, M.D., Consulting Surgeon to the Hospital of the Good Shepherd, Radnor; Medical Director of the Bureaus of Police and Fire of the Department of Public Safety.

*1882. ASHBRIDGE, RICHARD, M.D., Assistant Surgeon U.S. Navy.

ELECTED

1863. Ashhurst, John, Jr., M.D., Professor of Surgery in the University of Pennsylvania; Surgeon to the Pennsylvania and the Children's Hospitals; Consulting Surgeon to St. Christopher's and the Woman's Hospitals, and to the Hospital of the Good Shepherd, Radnor.

1865. Ashhurst, Samuel, M.D., Surgeon to the Children's Hospital.

1857. Atlee, Walter F., M.D., Consulting Physician and Surgeon to St. Luke's Hospital, Bethlehem.

1852. Bache, Thomas Hewson, M.D.

1883. Baer, Benjamin F., M.D., Professor of Gynecology in the Philadelphia Polyclinic.

1879. Baker, Washington H., M.D., Obstetrician to the Maternity Hospital.

1876. Baldwin, Louis K., M.D., Examining Physician to the Hospital of the Good Shepherd, Radnor.

1889. Baldy, John M., M.D.

1880. Bartholow, Roberts, M.D., Professor of Materia Medica, General Therapeutics, and Hygiene in the Jefferson Medical College.

1883. Baum, Charles, M.D.

1873. Baxter, H. F., M.D.

1883. Beates, Henry, M.D.

1860. Benner, Henry D., M.D.

1874. Bennett, W. H., M.D., Physician to St. Christopher's Hospital.

1884. Biddle, Alexander W., M.D.

1884. Biddle, Thomas, M.D.

*1866. Black, J. J., M.D.

*1867. Boardman, Charles H., M.D.

1859. Boker, Charles S., M.D., Surgeon to St. Joseph's Hospital.

1884. Bradford, Thomas Hewson, M.D., Physician to the Dispensary of the Children's Hospital and to the Gynecological Departments of the Pennsylvania and the Howard Hospitals.

ELECTED

1856. BRINTON, JOHN H., M.D., Professor of the Practice of Surgery and of Clinical Surgery in the Jefferson Medical College; Surgeon to St. Joseph's Hospital; Consulting Surgeon to the Southwestern Hospital of Philadelphia.

1887. BRUBAKER, ALBERT P., M.D., Professor of Physiology and General Pathology in the Pennsylvania College of Dental Surgery; Demonstrator of Physiology in the Jefferson Medical College.

1890. BRUSH, EDWARD N., M.D.

*1851. BULLOCK, WILLIAM R., M.D.

1887. BUNTING, ROSS R., M.D.

1870. BURNETT, CHARLES H., M.D., Aurist to the Presbyterian Hospital; Consulting Aurist to the Pennsylvania Institution for the Deaf and Dumb; Lecturer on Otology in the Woman's Medical College.

1886. CADWALADER, CHARLES E., M.D.

1885. CHAPIN, JOHN B., M.D., Physician to the Pennsylvania Hospital for the Insane.

1880. CHAPMAN, HENRY C., M.D., Professor of the Institutes of Medicine and of Medical Jurisprudence in the Jefferson Medical College.

1868. CHESTON, D. MURRAY, M.D.

1873. CLARK, LEONARDO S., M.D.

1872. CLEEMANN, RICHARD A., M.D.

*1842. CLYMER, MEREDITH, M.D.

1871. COHEN, J. SOLIS, M.D., Consulting Physician to the German Hospital.

1888. COHEN, S. SOLIS, M.D., Professor of Clinical Medicine and of Applied Therapeutics in the Philadelphia Polyclinic; Consulting Physician to the Jewish Hospital; Lecturer on Special Therapeutics in the Jefferson Medical College.

1866. CRUICE, R. B., M.D., Surgeon to St. Joseph's Hospital.

1884. CURTIN, R. G., M.D., Lecturer on Physical Diagnosis in the University of Pennsylvania; Assistant Physician to the University Hospital; Physician to the Philadelphia and the Presbyterian Hospitals.

ELECTED

1884. Da Costa, J. C., M.D., Gynecologist to the Jefferson Medical College Hospital.

1884. DaCosta, J. M., M.D., LL.D., Professor of the Principles and Practice of Medicine in the Jefferson Medical College; Physician to the Pennsylvania Hospital; Consulting Physician to the Children's Hospital and to the Northern Dispensary.

1887. Daland, Judson, M.D., Instructor in Clinical Medicine in the University of Pennsylvania and Assistant Physician to the Hospital of the same.

1859. Darrach, James, M.D., Consulting Surgeon to the Germantown Hospital.

1888. Davis, Edward P., M.D., Professor of Obstetrics and Diseases of Children in the Philadelphia Polyclinic; Demonstrator of Obstetrics in the Jefferson Medical College; Visiting Obstetrician to the Philadelphia Hospital.

1889. Davis, G. G., M.D., Assistant Surgeon to the Episcopal and Orthopædic Hospitals; Surgeon to the Dispensary of the Children's Hospital; Assistant Demonstrator of Surgery in the University of Pennsylvania.

1874. Deakyne, A. C., M.D.

*1870. Deal, L. J., M.D.

1887. Deaver, John B., M.D., Demonstrator of Anatomy and Lecturer on Topographical Anatomy in the University of Pennsylvania; Surgeon to the German and to St. Mary's Hospitals.

1885. Dercum, Francis X., M.D., Instructor in Nervous Diseases in the University of Pennsylvania; Neurologist to the Philadelphia Hospital.

1884. Downs, R. N., M.D.

1884. Drysdale, T. M., M.D., Consulting Gynecologist to the Hospital of the Medico-Chirurgical College.

1864. Duer, Edward L., M.D., Accoucheur to the Philadelphia Hospital; Surgeon to the Maternity Hospital; Visiting Physician to the Preston Retreat.

1871. Duhring, L. A., M.D., Clinical Professor of Skin Diseases to the Hospital of the University of Pennsylvania; Derma-

ELECTED

tologist to the Philadelphia Hospital; Consulting Physician to the Philadelphia Dispensary for Skin Diseases.

1881. Dulles, Charles Winslow, M.D.

1863. Dunglison, Richard J., M.D.

*1871. Dunglison, Thomas R., M.D.

1888. Dunn, Thomas D., M.D.

*1849. Dunott, Justus, M.D.

1860. Dunton, William R., M.D., Consulting Physician to the Germantown Hospital.

1882. Edwards, Joseph F., M.D.

*1887. Edwards, William A., M.D.

*1880. Eskridge, J. T., M.D.

1868. Evans, Horace Y., M.D., Physician to the Charity Hospital.

1884. Fenton, Thomas H., M.D.

1866. Fischer, Emil, M.D.

1884. Fisher, Henry M., M.D., Physician to the Episcopal Hospital; Microscopist to the Pennsylvania Hospital and Physician to the Ont-patient Department.

1888. Flick, Lawrence F., M.D.

1862. Forbes, William S., M.D., Professor of Anatomy in the Jefferson Medical College.

1870. Ford, W. H., M.D.

1884. Formad, H. F., M.D., Lecturer on Experimental Pathology and Demonstrator of Morbid Anatomy in the University of Pennsylvania; Pathologist to the Philadelphia Hospital.

1885. Fox, Joseph M., M.D., Surgeon to the Out-patient Department of the Pennsylvania and the Children's Hospitals.

1890. Freeman, Walter J., M.D.

1885. Fricke, Albert, M.D.

1889. Fussell, M. Howard, M.D., Physician to the Medical Dispensary of the University of Pennsylvania.

1873. Gerhard, George S., M.D.

1884. Getchell, F. H., M.D.

ELECTED

1885. GIRVIN, ROBERT M., M.D., Gynecologist to the Presbyterian Hospital.

1889. GITHENS, WILLIAM H., M.D.

1884. GODEY, HARRY, M.D.

1868. GOODELL, WILLIAM, M.D., Professor of Clinical Gynecology in the University of Pennsylvania; Consulting Physician to the Lying-in Department of the Northern Dispensary.

1867. GOODMAN, H. EARNEST, M.D., Professor of Surgery in the Medico-Chirurgical College; Surgeon to the Wills and the Orthopædic Hospitals: Consulting Surgeon to the Maternity Hospital.

1885. GRAHAM, JOHN, M.D.

1870. GRIER, M. J., M.D.

1873. GRIFFITH, J. P. CROZER, M.D., Instructor in Clinical Medicine in the University of Pennsylvania, and Assistant Physician to the Hospital; Physician to St. Agnes' and the Howard Hospitals; Pathologist to the Presbyterian Hospital.

1883. GROSS, FERDINAND H., M.D., Surgeon to the German Hospital.

1871. GROVE, JOHN H., M.D., Surgeon to St. Mary's and to St. Agnes' Hospitals.

1889. GUITÉRAS, JOHN, M.D., Professor of General Pathology and Morbid Anatomy in the University of Pennsylvania.

1863. HALL, A. DOUGLASS, M.D., Surgeon to Wills Eye Hospital.

1890. HALL, JOHN C., M.D.

*1859. HAMMOND, WILLIAM A., M.D., Surgeon-General U. S. A. Retired.

1886. HANSELL, HOWARD F., M.D., Chief Clinical Assistant to the Ophthalmological Department of the Jefferson Medical College Hospital; Ophthalmic and Aural Surgeon to the Southwestern Hospital.

ELECTED

1889. Hare, Hobart A., M.D., Demonstrator of Therapeutics and Instructor in Physical Diagnosis and in Physiology in the University of Pennsylvania; Physician to St. Agnes' Hospital and to the Children's Dispensary of the University Hospital.

1865. Harlan, George C., M.D., Surgeon to Wills Eye Hospital and to the Eye and Ear Department of the Pennsylvania Hospital.

1863. Harlow, Lewis D., M.D.

1862. Harris, Robert P., M.D.

1885. Harte, Richard H., M.D., Demonstrator of Osteology in the University of Pennsylvania and Assistant Surgeon to the Hospital; Surgeon to the Out-patient Department of the Pennsylvania Hospital.

1851. Hartshorne, Henry, M.D., LL.D.

1888. Hartzell, Milton B., M.D., Pathologist to the Presbyterian Hospital; Assistant Physician to the Dispensary for Skin Diseases, University of Pennsylvania.

*1849. Hastings, John, M.D.

1872. Hays, I. Minis, M.D.

1882. Hearn, Joseph, M.D., Surgeon to the Hospital of the Jefferson Medical College and to the Philadelphia Hospital.

1884. Henry Frederick P., M.D., Physician to the Jefferson Medical College and the Philadelphia Hospitals.

1872. Hinkle, A. G. B., M.D.

1888. Hirsh, Abram B., M.D., Adjunct Professor of General and Orthopædic Surgery to the Philadelphia Polyclinic.

1888. Hirst, Barton Cooke, M.D., Associate Professor of Obstetrics in the University of Pennsylvania; Gynecologist to the Orthopædic Hospital; Obstetrician to the Philadelphia and Maternity Hospitals.

1885. Holland, James W., M.D., Professor of Medical Chemistry and Toxicology in the Jefferson Medical College.

1879. Hopkins, William Barton, M.D., Surgeon to the Episcopal Hospital and to the Out-patient Department of the Pennsylvania Hospital.

ELECTED

1867. Horn, George H., M.D.

1888. Horwitz, Orville, M.D., Chief Clinical Assistant in the Surgical Dispensary of the Jefferson Medical College Hospital.

1868. Howell, Samuel B., M.D.

1881. Huidekoper, Rush Shippen, M.D.

1884. Hunt, J. Gibbons, M.D.

1854. Hunt, William, M.D., Surgeon to the Pennsylvania and the Orthopædic Hospitals.

1871. Ingham, James V., M.D.

1885. Jackson, Edward, M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic.

1887. Jayne, Horace, M.D., Professor of Vertebrate Morphology in the Biological Department of the University of Pennsylvania.

*1864. Jones, S. P., M.D.

1885. Judd, Leonardo Da Vinci, M.D.

1867. Judson, Oliver A., M.D.

1886. Jurist, Louis, M.D., Chief of Throat Department in the Jefferson Medical College Hospital.

1877. Keating, John M., M.D., Obstetrician to the Philadelphia Hospital; Physician to St. Joseph's and the Howard Hospitals.

1849. Keating, William V., M.D., Physician to St. Joseph's Hospital.

1867. Keen, William W., M.D., Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College.

*1887. Kelly, Howard A., M.D., Associate Professor of Gynecology in the Johns Hopkins University, and Gynecologist and Obstetrician to the Hospital.

*1844. King, Charles R., M.D.

1875. Kirkbride, Joseph J., M.D.

*1865. La Roche, C. Percy, M.D.

1887. Leaman, Henry, M.D.

ELECTED

1883. Leffmann, Henry, M.D., Professor of Chemistry in the Philadelphia Polyclinic and in the Woman's Medical College; Pathological Chemist to the Jefferson Medical College Hospital.

1851. Leidy, Joseph, M.D., Professor of Anatomy in the University of Pennsylvania.

1885. Leidy, Philip, M.D.

1855. Lewis, Francis W., M.D.

1877. Lewis, Morris J., M.D., Physician to the Children's Hospital and to the Orthopædic Hospital and Infirmary for Nervous Diseases.

1886. Lloyd, J. Hendrie, M.D., Instructor in Electro-therapeutics in the University of Pennsylvania; Physician-in-charge of Home for Crippled Children; Neurologist to the Philadelphia Hospital.

1877. Longstreth, Morris, M.D., Lecturer on Pathological Anatomy in the Jefferson Medical College; Physician and Pathologist to the Pennsylvania Hospital.

1886. MacCoy, Alexander, M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Lecturer on Diseases of the Throat and Nose in the Woman's Medical College of Philadelphia.

1875. McClellan, George, M.D., Surgeon to the Philadelphia and the Howard Hospitals.

1871. McFerran, J. A., M.D.

*1885. Mallet, John W., M.D.

1889. Martin, Edward, M.D., Surgeon to the Philadelphia and the Howard Hospitals; Instructor in Operative Surgery in the University of Pennsylvania.

1887. Massey, Isaac, M.D., Surgeon to the Pennsylvania Railroad.

*1850. Mayer, Edward R., M.D.

1885. Mays, Thomas J., M.D., Professor of Diseases of the Chest and of Experimental Therapeutics in the Philadelphia Polyclinic.

ELECTED

1868. Mears, J. Ewing, M.D., Professor of Anatomy and Clinical Surgery in the Pennsylvania College of Dental Surgery; Demonstrator of Surgery in the Jefferson Medical College, and Gynecologist to the Hospital of the same; Surgeon to St. Mary's Hospital.

1875. Meigs, Arthur V., M.D., Physician to the Pennsylvania and the Children's Hospitals; Consulting Physician to the Pennsylvania Institution for the Instruction of the Blind.

*1884. Mifflin, Houston, M.D.

1881. Mills, Charles K., M.D., Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic; Lecturer on Mental Diseases in the University of Pennsylvania, and on Nervous Diseases in the Woman's Medical College; Neurologist to the Philadelphia Hospital, and Consulting Physician to the Department for the Insane of the Philadelphia Hospital.

1888. Mitchell, John K., M.D., Instructor in Clinical Medicine in the University of Pennsylvania; Attending Physician to St. Mary's Hospital; Assistant Physician to the University Hospital and to the Infirmary for Nervous Diseases.

1856. Mitchell, S. Weir, M.D., Professor of Diseases of the Mind and Nervous Diseases in the Philadelphia Polyclinic; Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Physician to the Maternity Hospital.

1882. Montgomery, Edward E., M.D., Professor of Gynecology and of Clinical Gynecology in the Medico-Chirurgical College; Obstetrician to the Philadelphia Hospital.

1863, Morehouse, George R., M.D., Physician to St. Joseph's Hospital.

1886. Morris, Caspar, M.D., Physician to the Episcopal Hospital and to the Out-patient Department of the Pennsylvania Hospital.

1883. Morris, Henry, M.D., Gynecologist to the Howard Hospital.

ELECTED

1856. Morris, J. Cheston, M.D.

1861. Morton, Thomas G., M.D., Surgeon to the Pennsylvania and the Orthopædic Hospitals: Consulting Surgeon to the Jewish Hospital; Emeritus Surgeon to Wills Eye Hospital.

1864. Moss, William, M.D.

1890. Müller, Auguste F., M.D., 4753 Green St., Germantown.

1882. Musser, John H., M.D., Assistant Professor of Clinical Medicine in the University of Pennsylvania; Physician to the Philadelphia Hospital.

1886. Neff, Joseph F., M.D.

1877. Neilson, Thomas Rundle, M.D., Surgeon to the Episcopal Hospital; Instructor in Genito-Urinary Diseases and Assistant Demonstrator of Anatomy in the University of Pennsylvania, and Chief of the Venereal Dispensary in the Hospital of the same.

1889. Noble, Charles P., M.D., Surgeon-in-Chief to the Kensington Hospital for Women; Surgeon-in-charge of the Department for Women of the Northern Dispensary.

1869. Norris, Herbert, M.D., Supervising Physician to St. Clement's Hospital.

1865. Norris, Isaac, Jr., M.D.

1866. Norris, William F., M.D., Honorary Professor of Ophthalmology and Clinical Professor of Diseases of the Eye in the University of Pennsylvania; Surgeon to Wills Eye Hospital.

1884. Oliver, Charles A., M.D., Surgeon to the Wills Eye Hospital; Ophthalmic Surgeon to the Presbyterian Hospital; Consulting Ophthalmic Surgeon to St. Mary's and the Maternity Hospitals.

1884. O'Neill, J. W., M.D.

*1885. Osler, William, M.D., Professor of Medicine in the Johns Hopkins University, and Physician to the Hospital.

ELECTED

1890. PACKARD, FREDERICK A., M.D.

1858. PACKARD, JOHN H., M.D., Surgeon to the Pennsylvania and St. Joseph's Hospitals.

1864. PANCOAST, WILLIAM H., M.D., Professor of Anatomy and of Clinical Surgery in the Medico-Chirurgical College; Consulting Surgeon to the Philadelphia Hospital for Skin Diseases.

1882. PARISH, WILLIAM H., M.D., Professor of Anatomy in the Woman's Medical College; Obstetrician to the Philadelphia Hospital.

*1854. PARRISH, JOSEPH, M.D.

1883. PARVIN, THEOPHILUS, M.D., Professor of Obstetrics and Diseases of Women and Children in the Jefferson Medical College; Obstetrician to the Philadelphia Hospital.

1889. PENROSE, CHARLES BINGHAM, M.D., Surgeon to the Gynecean Hospital; Surgeon to the Out-patient Department of the Pennsylvania and St. Agnes' Hospitals; Assistant Surgeon to the University Hospital.

1854. PENROSE, R. A. F., M.D., LL.D., Emeritus Professor of Obstetrics and Diseases of Women and Children in the University of Pennsylvania; Consulting Obstetrician to the Maternity Hospital; Visiting Physician to the Preston Retreat.

1868. PEPPER, WILLIAM, M.D., LL.D., Provost of the University of Pennsylvania and Professor of the Theory and Practice of Medicine in the same.

1884. PERKINS, FRANCIS M., M.D., Ophthalmic and Aural Surgeon to the Dispensary of St. Mary's Hospital; Visiting Ophthalmic Surgeon to the Hospital of the Good Shepherd at Radnor.

1890. PHILLIPS, J. WILLOUGHBY, M.D.

1883. PIERSOL, GEORGE A., M.D., Professor of Histology and Embryology in the University of Pennsylvania.

1862. PORTER, WILLIAM G., M.D., Surgeon to the Presbyterian and the Philadelphia Hospitals.

1885. POTTER, THOMAS C., M.D.

ELECTED

1887. PRICE, JACOB, M.D.

1889. PRICE, JOSEPH, M.D., Surgeon to the Gynecean Hospital; Physician-in-charge of the Preston Retreat and of the Female Department of the Philadelphia Dispensary.

1889. RANDALL, B. ALEXANDER, M.D., Professor of Diseases of the Ear in the Philadelphia Polyclinic; Ophthalmic and Aural Surgeon to the Episcopal and Children's Hospitals.

1887. REED, CHARLES H., M.D.

1866. REED, THOMAS B., M.D., Surgeon to the Presbyterian Hospital.

1842. REESE, JOHN J., M.D., Professor of Medical Jurisprudence in the University of Pennsylvania.

1885. REICHERT, EDWARD T., M.D., Professor of Physiology in the University of Pennsylvania.

*1884. REX, FRANCIS M., M.D.

1888. REX, GEORGE A., M.D.

1883. REX, OLIVER P., M.D., Clinical Lecturer on Diseases of Children in the Jefferson Medical College, and Physician to the Hospital; Physician to the Presbyterian Hospital.

*1857. RICHARDSON, TOBIAS G., M.D.

1882. ROBERTS, A. SYDNEY, M.D.

1878. ROBERTS, JOHN B., M.D., Professor of Anatomy and Surgery in the Philadelphia Polyclinic; Professor of Surgery in the Woman's Medical College of Pennsylvania; Lecturer on Anatomy in the University of Pennsylvania; Consulting Surgeon to the Jewish Hospital; Surgeon to St. Agnes' Hospital.

1888. ROBINS, ROBERT P., M.D., Visiting Physician to the Dispensary of the House of Industry, to the Church Home for Children, and to the Board of Guardians of the Poor; Lecturer on Chemistry in the Episcopal Academy.

1838. RUSCHENBERGER, W. S. W., M.D., Medical Director, U. S. N.

*1852. SARGENT, FITZ WILLIAM, M.D.

*1864. SARGENT, WINTHROP, M.D.

ELECTED

1866. SCHAFFER, CHARLES, M.D., Professor of Botany in the Pennsylvania Horticultural Society.

1877. DE SCHWEINITZ, GEORGE E., M.D., Ophthalmic and Aural Surgeon to the Children's Hospital; Ophthalmologist to the Orthopædic Hospital; Assistant Surgeon to the Dispensary for Diseases of the Eye in the University of Pennsylvania.

1888. SELTZER, CHARLES M., M.D.

1875. SEYFERT, THEODORE H., M.D., Physician to the Gynecological Hospital and Infirmary for Diseases of Children.

1884. SHAFFNER, CHARLES, M.D.

1877. SHAKESPEARE, EDWARD O., M.D., Pathologist and Ophthalmologist to the Philadelphia Hospital.

1868. SHAPLEIGH, E. B., M.D.

1876. SHIPPEN, EDWARD, M.D., U. S. N.

1890. SHOEMAKER, GEORGE ERETY, M.D.

1880. SIMES, J. H. C., M.D., Professor of Genito-Urinary and Venereal Diseases in the Philadelphia Polyclinic; Surgeon to the Episcopal Hospital and to St. Christopher's Hospital.

1873. SIMPSON, JAMES, M.D., Physician to St. Mary's Hospital.

1872. SINKLER, WHARTON, M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Neurologist to the Philadelphia Hospital.

*1863. SMITH, A. K., M.D., U. S. A.

*1864. SMITH, EDWARD A., M.D.

*1856. SMITH, R. K., M.D.

1884. SMITH, ROBERT MEADE, M.D., Professor of Comparative Physiology in the University of Pennsylvania.

1875. STARR, LOUIS, M.D., Physician to the Children's Hospital; Clinical Professor of Diseases of Children in the University of Pennsylvania.

1884. STELWAGON, HENRY W., M.D., Instructor in Dermatology and Chief of the Dispensary for Diseases of the Skin of the University of Pennsylvania; Physician to the Philadelphia Dispensary for Skin Diseases; Dermatolo-

ELECTED

gist to the Northern Dispensary and to the Howard and Philadelphia Hospitals; Lecturer on Dermatology in the Woman's Medical College.

1888. Stewart, David D., M.D., Physician to St. Christopher's Hospital.

1842. Stillé, Alfred, M.D., LL.D., Emeritus Professor of the Theory and Practice of Medicine in the University of Pennsylvania; Consulting Physician to the Maternity and the Woman's Hospitals.

1846. Stocker, Anthony E., M.D.

1889. Stone, J. Farrar, M.D.

1884. Stryker, S. S., M.D., Obstetrician to the Philadelphia Hospital.

1886. Taylor, John Madison, M.D., Physician to Howard Hospital; Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Physician to the Dispensary of the Children's Hospital.

1867. Taylor, R. R., M.D.

1887. Taylor, William J., M.D.

1886. Taylor, William L., M.D., Instructor in Clinical Gynecology in the University of Pennsylvania, and Chief of the Clinic and Assistant Gynecologist to the Hospital of the same; Surgeon-in-chief to the Beacon Service for Women.

1867. Thomas, Charles H., M.D.

1869. Thomson, William, M.D., Honorary Professor of Ophthalmology in the Jefferson Medical College and Ophthalmic Surgeon to the Hospital of the same; Emeritus Surgeon to the Wills Eye Hospital.

*1854. Tilden, W. P., M.D.

*1870. Turner, A. Paul, M.D.

1866. Tyson, James, M.D., Professor of Clinical Medicine in the University of Pennsylvania; Physician to the Philadelphia Hospital.

*1852. Tyson, James L., M.D.

ELECTED

1864. VANDYKE, E. B., M.D.

1873. VAN HARLINGEN, ARTHUR, M.D., Professor of Diseases of the Skin in the Philadelphia Polyclinic; Consulting Physician to the Philadelphia Dispensary for Skin Diseases; Dermatologist to the Howard Hospital; Lecturer on Dermatology in Jefferson Medical College.

1883. VINTON, CHARLES HARROD, M.D.

1885. WALKER, JAMES B., M.D., Professor of Practice of Medicine in the Woman's Medical College of Pennsylvania; Attending Physician to the Philadelphia Hospital; Lecturer on Clinical Medicine and Consulting Physician to the Woman's Hospital.

1886. WATSON, E. W., M.D.

1875. WEBB, WILLIAM H., M.D.

1883. WELCH, WILLIAM M., M.D., Physician to the Municipal Hospital for Contagious Diseases; Lecturer on Exanthemata and Vaccinia in the Medico-Chirurgical College.

1884. WHARTON, H. R., M.D., Surgeon to the Children's Hospital; Instructor in Clinical Surgery in the University of Pennsylvania and Assistant Surgeon to the Hospital of the same; Attending Physician to the Pennsylvania Institution for the Deaf and Dumb.

1883. WHELEN, ALFRED, M.D.

1878. WHITE, J. WILLIAM, M.D., Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the Philadelphia and the Maternity Hospitals.

1880. WILLARD, DEFOREST, M.D., Clinical Professor of Orthopædic Surgery in the University of Pennsylvania; Surgeon to the Presbyterian Hospital; Consulting Surgeon to the White and to the Colored Cripples' Homes and to the Home for Incurables.

*1878. WILLIAMSON, JESSE, M.D.

1881. WILSON, H. AUGUSTUS, M.D., Professor of Orthopædic Surgery in the Philadelphia Polyclinic.

1874. WILSON, JAMES C., M.D., Lecturer on Renal Diseases in

ELECTED

the Jefferson Medical College and Physician to the Hospital of the same; Physician to the Philadelphia Hospital.

1887. WILSON, JAMES F., M.D.

1884. WIRGMAN, CHARLES, M.D., Physician to the Hospital of the Jefferson Medical College and to the Howard Hospital.

1852. WISTER, OWEN JONES, M.D., Consulting Surgeon to the Germantown Hospital.

1865. WOOD, HORATIO C., M.D., Professor of Materia Medica, Pharmacy, and General Therapeutics in the University of Pennsylvania, and Clinical Professor of Diseases of the Nervous System in the Hospital of the same.

1880. WOODBURY, FRANK, M.D., Honorary Professor of Clinical Medicine in the Medico-Chirurgical College of Philadelphia and Physician to the Hospital of the same.

1866. WOODS, D. F., M.D., Physician to the Presbyterian Hospital.

1888. WOODWARD, CHARLES E., M.D., Physician to the Chester Co. Prison and West Chester Board of Health.

1878. WORMLEY, THEODORE G., M.D., LL.D., Professor of Chemistry in the University of Pennsylvania.

1860. WURTS, CHARLES STEWART, M.D.

1861. YARROW, THOMAS J., M.D.

1889. YOUNG, JAMES K., M.D., Instructor in Orthopædic Surgery and Assistant Demonstrator of Surgery in the University of Pennsylvania; Orthopædic Surgeon in the Out-patient Department of the Hospital.

*1840. ZANTZINGER, WILLIAM S., M.D.

1887. ZEIGLER, WALTER M. L., M.D., Assistant Aural Surgeon and Chief of the Dispensary for Diseases of the Ear in the Hospital of the University of Pennsylvania.

[It is particularly requested that any change of appointment, etc., may be communicated to the Committee of Publication before the first of November in each year, in order that the above list may be made as correct as possible.]

# ASSOCIATE FELLOWS.

[Limited to Fifty, of whom Twenty may be Foreigners.]

ELECTED

1873. Acland, Henry W., M.D., F.R.S., Oxford, England.
1890. Bacelli, Guido, Rome, Italy.
1876. Barker, Fordyce, M.D., New York.
1877. Barnes, Robert, M.D., London, England.
1876. Billings, John S., M.D., U.S.A., Washington, D. C.
1876. Bowditch, Henry I., M.D., Boston, Massachusetts.
1886. Bowditch, Henry P., M.D., Boston, Massachusetts.
1865. Butcher, R. G., M.D., M.R.C.S., Dublin, Ireland.
1877. Chaillé, Stanford E., M.D., New Orleans, Louisiana.
1886. Cheever, David W., M.D., Boston, Massachusetts.
1876. Comegys, C. G., M.D., Cincinnati, Ohio.
1876. Corson, Hiram, M.D., Norristown, Pennsylvania.
1876. Davis, N. S., M.D., Chicago, Illinois.
1876. Donaldson, F., M.D., Baltimore, Maryland.
1886. Draper, William H., M.D., New York.
1883. Fayrer, Sir Joseph, M.D., LL.D., F.R.S., London, England.
1876. Green, Traill, M.D., Easton, Pennsylvania.
1883. Heath, Christopher, F.R.C.S., London, England.
1874. Jackson, J. Hughlings, M.D., London, England.
1876. Johnson, George, M.D., F.R.S., London, England.
1876. Johnston, Christopher, M.D., Baltimore, Maryland.
1876. Jones, Joseph, M.D., New Orleans, Louisiana.
1876. King, James, M.D., Pittsburg, Pennsylvania.
1876. Kinloch, R. A., M.D., Charleston, South Carolina.

ELECTED

1877. Lister, Sir Joseph, Bart., M.D., LL.D., F.R.S., London, England.

1865. Macleod, G. H. B., M.D., Glasgow, Scotland.

1886. McGuire, Hunter, M.D., Richmond, Virginia.

1876. Moore, E. M., M.D., Rochester, New York.

1876. Mowry, R. B., M.D , Allegheny City, Pennsylvania.

1873. Ogle, John W., M.D., London, England.

1874. Paget, Sir James, Bart., M.D., LL.D., F.R.S., D.C.L., London, England.

1876. Pollock, A. M., M.D., Pittsburg, Pennsylvania.

1876. Porcher, F. Peyre, M.D., Charleston, South Carolina.

1886. Reeve, John C., M.D., Dayton, Ohio.

1886. Senn, Nicholas, M.D., Milwaukee, Wisconsin.

1886. Shattuck, George C., M.D., Boston, Massachusetts.

1886. Thomas, T. Gaillard, M.D., New York.

1869. Valcourt, Th. de, M.D., Cannes, France.

1886. Whittaker, James T., M.D., Cincinnati, Ohio.

1886. Yandell, David W., M.D., Louisville, Kentucky.

# CORRESPONDING MEMBERS.

ELECTED

1880. Carrow, Fleming, M.D., United States.

1880. Chiara, Domenico, M.D., Florence, Italy.

1886. Dey, Kanny Loll, M.D., Calcutta, India.

1889. Fedeli, Gregorio, M.D., Rome, Italy.

1885. Rendu, Jean, M.D., Lyons, France.

1886. Richards, Vincent, Goalunda, India.

1889. Strahan, John, M.D., Belfast, Ireland.

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## ANNUAL ADDRESS OF THE PRESIDENT.

By D. HAYES AGNEW, M.D.

[Delivered December 3, 1890.]

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Fellows of the College of Physicians: In compliance with the time-honored custom of this College, your President annually reviews, briefly, the events of the year just passed and makes such suggestions for the future as seem to him wise and desirable. In fulfilling this duty, I have not unnaturally been led to contrast my present position and surroundings with those of some of my predecessors, and the retrospect has led me back to the corresponding year in the last century. In December, 1790, Dr. John Redman, the first incumbent of the Chair which I now have the honor to occupy, had been President of the College for three years; resigning in 1805 at the age of eighty-three years.

The history of the labors and progress of the College through the century which since his time has intervened is a familiar and oft-told tale. During that hundred years the most distinguished names in the history of American medicine and surgery have been enrolled upon its lists; the most renowned teachers, the most learned authors, the most skilful practitioners have been its guiding spirits, and the records of their work and deeds constitute one of the most brilliant chapters in the history of the profession in this country.

It is no small honor, therefore, to address you from its presidential chair, and in doing so once more, I may, with propriety, use the exact words of my predecessor of 1790, who, after telling the Fellows that while he had accepted the position they had conferred upon him, and had undertaken with a good will the trust they had reposed in him, yet added: "I do so with some fears but with a resolution to exert in the best manner I can all the powers I have still remaining, to which I hope your generosity will add new vigor and strength, to promote the credit and usefulness of our well-intended institution." It will be no-

ticed that he used the term "well-intended." It is true that in those days their work must have seemed to be all in front of them. The College was in its infancy; the membership was small; there were no traditions of past labor and successes to arouse in the Fellows the spirit of emulation; but in spite of this, as we all know, the founders won for themselves by their earnest and often self-sacrificing labors a large share of material prosperity, exerted a commanding influence in their day and generation, and at the same time started the College upon its unexampled career of honor and usefulness.

I am happy to state that the past year constitutes no exception in the history of this good work.

The twenty-three papers read before the College during 1890, were all of them valuable acquisitions to medical and surgical literature, and in some instances were noteworthy additions to the sum of human knowledge. The discussions to which they gave rise were thorough and vigorous, but were always conducted with the courtesy appropriate to the character of this body. It may, indeed, fairly be said, that both as to the influence exerted upon the medical thought and progress of the day, as to the social and professional character of its members, and as to the harmony and good feeling prevailing among them, the College of 1890 is a worthy successor of the College of 1790, the College of Redman, Rush, Kuhn, Shippen, and Morgan.

The additions to the Mütter Museum during the year number fifty-four, many of them being of considerable pathological interest. It should be borne in mind that even specimens which are not of themselves and singly of special rarity or importance become of great value when classed with similar ones and studied in groups large enough to admit of comparison as to points of variation from, or conformity to a prevailing type. The museum has some faithful friends, but the collection would increase far more rapidly, not only numerically but in practical value, if the Fellows would send to it all available specimens, giving the Curator the privilege of returning such as, in his judgment, would not be desirable permanent additions.

The accessions to the Library from November 1, 1889, to November 1, 1890, amount to 2743 volumes, 3441 pamphlets, and 24,071 numbers of different medical journals. Among the many gifts from members it seems proper to mention that of 401 volumes from Dr. Hewson's library, presented by Dr. Da Costa; and that of 96 volumes and 114 pamphlets,

many of them relating to cholera, presented by Dr. E. O. Shakespeare. Our library now numbers 44,662 volumes, and is worthy of the pride and interest of every member of the profession in Philadelphia. It renders possible those labors which have led many of the Fellows to well-deserved reputation and success; it aids materially in sustaining the exceptionally high standard of medical excellence in this city; and it assists in keeping Philadelphia the medical text-book centre of the country. It is amply deserving of the support and the generous bounty of every member of the College.

The Directory for Nurses, under its present efficient management, continues to be a fruitful source of income to the College. During the present year, at least up to November 1st, it has contributed $240 to the hall committee, and $2000 to the College library. But much as we are thus pecuniarily indebted to it, its sphere of real usefulness is still wider and more important. It has been a genuine benefit to the whole community. By classifying and systematizing the nurses, recording their behavior and qualifications, selecting and supplying them day or night, with intelligent reference to their special fitness for and experience in particular cases, it has done and is doing a most useful work, and has reflected credit upon the College. It is very desirable, therefore, that Fellows should procure nurses through its instrumentality, and not by personal request; and it is equally desirable, both for the good of the College and the advantage of the sick, that all cases of dereliction, or ignorance on the part of nurses, should be immediately and unhesitatingly reported.

As time rolls by we cannot escape the sad duty of noting the removal of valued members by death.

On December 27, 1889, Dr. James H. Hutchinson, a Fellow since 1863, and one of the most active and respected members of the College, was stricken in the very strength of his manhood. In his case I have but to remind you of the truthful tribute paid to his memory at our last meeting by his life-long friend, a tribute written with a pen dipped in the ink of the heart.

On March 15, 1890, Dr. Henry S. Schell, a Fellow since 1870, died at San Diego, California. He had been a well-liked and respected member of the profession in this city for many years, but broke down and left here in pursuit of the health which he never regained.

On June 20, 1890, Dr. Lewis Rodman, a Fellow since 1843, died in

the 84th year of his age. He was a good, kind, sweet-tempered physician, a man without an enemy, a model of the old-fashioned family doctor, a wise and sagacious practitioner, and his memory is enshrined in the hearts of thousands of the people of Philadelphia.

On July 22, 1890, Dr. John D. Griscom, a Fellow since 1842, died at his residence at Haverford, at the age of eighty-one. Dr. Griscom for many years previous to his death had been obliged to withdraw from active professional life, but always entertained a deep interest in the affairs of the College, and only a few days before his death spoke to me of the social and professional dignity and influence of this body at the time he was in the habit of attending its sessions.

On October 30, 1890, Dr. Henry J. Bigelow, of Boston, an Associate Fellow, died at the age of seventy-two. Dr. Bigelow's name and career are an integral portion of the surgical history of this century; his many valuable contributions to surgical literature would of themselves confer deserved eminence; but his original work in the improvement of the operation of lithotrity, which he revolutionized, would rank him among the benefactors of mankind.

I cannot close this melancholy list without reference to the death of Dr. Henry H. Smith, who, although he resigned in 1861, had been for nineteen years a Fellow of this College. Dr. Smith had held with honor many important professional positions, had discharged with marked ability the duties of Surgeon-General of Pennsylvania during the years of the war, had inaugurated and developed the teaching of minor and operative surgery in this country, and at the time of his death, April 11, 1890, was Emeritus Professor of Surgery in the University of Pennsylvania.

And still another, the last in the necrological roll, Dr. Samuel Lewis, who died November 26, 1890, a learned physician, a lover of books, and a munificent benefactor of this College.

And now, gentlemen, having thus discharged the more obvious duties associated with this annual function, let me in conclusion urge upon you an unflagging continuance in the broad and beneficent work of this College—a clear-headed and rational interest in the thought and movement of the day—a truly remarkable period in the history of medical and surgical science. Let me advise, as I have done on a previous occasion, that the College take a living part in the solution of the various problems with which we are confronted relating to the lessening of disease, the improvement of the general health, and the establishment of proper sanitary conditions in the community around us—for which line of action

we have abundant and encouraging precedent in the College records. And, finally, let me again recur to the address of my remote but honored predecessor of 1790, and express to you, as he did to the distinguished gentlemen who then occupied the places now worthily filled by you, my "hearty good-will to, and wishes for, the prosperity and success of the College of Physicians in everything that may render it honorable and useful in the relief and solace of our suffering fellow-mortals, and also for the peace and happiness of each of you, its members, in your several stations and relations, civil and social, both here and hereafter."

# BIOGRAPHICAL SKETCH

OF

# ADDINELL HEWSON, M.D.

By J. CHESTON MORRIS, M.D.

[Read June 4, 1890.]

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Prominent among the names of those who, in our midst, during the latter half of the nineteenth century, have by their own efforts and talents attained to fame and position, has long stood and will continue to stand that of the subject of this memoir. Earnest and enthusiastic in his devotion to the duties of his profession, constant in season and out of season in his advocacy of what he believed to be true, ever ready to seize upon and utilize the latest advances of science for the benefit of suffering humanity, yet tempering his zeal with discretion, and ready to allow for the differing opinions of others formed from different points of observation, he has passed from among us while many of the subjects which engaged his best powers of thought and investigation are still burning questions. Others have been settled by the logic of experience; but all of us who knew him well can but feebly express our sense of personal loss in his removal by death, and unite cordially in this tribute to his worth as a friend, a fellow-counsellor, and practitioner.

He was the eighth child of the late Prof. Thomas T. Hewson, who was President of this College from April, 1835, to February, 1848, the date of his death, and whose life and services were so simply yet ably set forth in the memoir read November 9, 1849, by his colleague, friend, and associate, the late Prof. Franklin Bache. Born November 22, 1828, Addinell was thus reared amid the highest and best professional surroundings, and of a stock which for successive generations had been productive of men of thought, who made their mark upon the medical science of their times. No one can read the "Introduction to

Hewson's Works" (Sydenham Society edition), by Gulliver, without being struck with the tone and quality of these men, and of the sense of how much of our present knowledge we owe to their patient investigations. Each one has honestly and carefully aimed to contribute his quota. It may seem but small—it may be embarrassed and encumbered with false conceptions of the truth, or even with erroneous views. Yet, from the mass of accurately-observed facts and discordant opinions will gradually be elucidated the science of the future. All honor then to the patient, honest, intelligent investigators who have preceded us as well as to those who are our co-laborers in the cause of relief to suffering humanity; and we need but to refer to the catalogue of the Fellows of this College at that period, and to recall the names of the professors of the Jefferson Medical College and the character of their work and mode of thought, to realize something of the atmosphere which surrounded his boyhood.

He went to the grammar school of the University of Pennsylvania, then the most flourishing school in Philadelphia, situated on Fourth below Arch, the principal of which was Rev. Samuel Wylie Crawford, D.D., a man distinguished for his rigid views of discipline, right, honor, truth, and manliness—a good scholar and painstaking teacher, who well deserved the esteem in which he was held, although tempered as it was in the views of his pupils with a wholesome awe of the rod, which it must be owned he at one time wielded with old-fashioned severity. Much of men's character in after-life is due to the impressions and associations of their school-days; and there are, doubtless, many among us who will smile as I thus recall to them the often bitter-sweet recollections of the old square building standing back from the street, separated from the rest of the world by large yards in front and rear surrounded by a brick wall, in the gateway of which sat the ancient dispenser of gingerbread, sour-balls, apples, and jujube paste to the lucky possessors of pennies, "fips," or "levies." A walk through the hall brought us into the main schoolroom and the awful presence of "Sammy," with his faithful "Toby" ever ready at his side. In these yards town-ball, shinny, "London loo," "prisoner's base," or "sides," or some such active, rough-and-tumble sport occupied the all-too-short minutes of recess, only to be further diminished frequently by fines for noise in school or missed recitations. Yet, there were made and moulded the characters of many who have received and are receiving at the hands of their fellow-citizens the

honors due to their merits and talents. A passing tribute of respect to the memory of their teacher is due and thus gladly paid.

From this school he went to the University of Pennsylvania, where he graduated from the Department of Arts in 1848, only a few months after the death of his father, who, though nearly seventy-five years of age, was still in the zenith of his fame, and active in all the duties of his profession. His mother had passed away in January, 1837, when Addinell was but eight years old. The tender, loving care of his sister supplied, as far as was possible, this severe loss.

Immediately on his graduation he entered on the study of medicine in the office of the late Professor Joseph Pancoast. But he was regarded by his late father's colleagues as to some extent their *protégé* and they all vied with each other in efforts for his success. He received the degree of M.D. from Jefferson Medical College in 1850. His thesis was on the "Prostate Gland."

Soon after, he went to Europe on a sailing-vessel as surgeon, and became a student under Sir William Wilde, at St. Mark's Hospital, attending lectures also at the Rotunda Hospital in Dublin. The relations between Sir William and himself were very pleasant, and he subsequently edited, at the request of the author, the work of the former on *Aural Surgery*, published by Lindsay & Blakiston, Philadelphia. He went to London and presented letters to Sir William Lawrence, who received him most cordially, and presented him with an old engraving in which is the likeness of William Hewson, as one of a group of students around John Hunter. Sir William offered to take him in partnership if he would live in London.

He returned to Philadelphia in 1851, and became one of the residents of the Pennsylvania Hospital. At the end of his term there, in September, 1852, he entered on the practice of his profession, at first on Tenth below Walnut, then soon after at 1005 Walnut, where he remained until 1860, when he moved to the northeast corner of Fifteenth and Walnut. His practice here was very large and successful. In 1875 he removed to the southwest corner of Twenty-first and Walnut, where he lived until 1881, when he again removed to the southeast corner of Fifteenth and Spruce, where he continued to live and practise until the time of his death.

He was elected assistant surgeon to the Hospital of the Protestant Episcopal Church in 1853, and surgeon in 1854, and served there most acceptably until 1855, when he resigned. He succeeded Dr. J. H.

B. McClellan at the summer school on College Avenue, in 1855, remaining several years in that position. He was elected surgeon to Wills Hospital for Diseases of the Eye, in 1855, continuing to occupy that post until 1864. He succeeded Dr. Ellerslie Wallace as physician to the House of Refuge. He was also elected surgeon at the Pennsylvania Hospital in 1861, remaining on its staff until 1867. During the civil war he was engaged as contract surgeon, on duty at Cherry Street Hospital. He was also surgeon of the St. George's Society from 1858 until his decease.

He became a Fellow of this College, also a member of the Philadelphia County Medical Society, and of the Academy of Natural Sciences, in 1853, and of the Pathological Society in 1857; of the American Medical Association in 1855, and of the International Medical Association in 1887. When, at the request of the late Prof. S. D. Gross, the Philadelphia Academy of Surgery was organized in his office, April 21, 1879, Dr. Hewson acted as chairman of its first meeting. He took frequent part in the debates and proceedings in all these bodies, and contributed largely the results of his observations. He also lectured in 1855 and several successive years in the summer school of Jefferson Medical College on surgery, as successor of Dr. J. H. B. McClellan, with Wallace, West, Bridges, F. G. Smith, and Keating as colleagues.

In 1872 he again went abroad for a year to recuperate his shattered health, and refresh himself by contact with the leading medical men of thought on the other side of the Atlantic. Among others he recalled afterwards with pleasure his meeting with Sir Henry Thompson, and was summoned to Mentone to treat Dr. H. R. Storer, of Newport, R. I., whose appreciative letters on the subject I here append.

HOTEL DE LA PAIX, MENTONE, Dec. 5, 1872.

MY DEAR SIR: I know by experience how annoying it is to be asked for advice when trying to get a vacation, but just now I am compelled to look at this question rather from a patient's side than our own. I've a bad knee, and by Markoe's advice am off work for an indefinite period. For the past few days matters have been a little less satisfactory, and should you find time to call on me when you come to Mentone, I shall esteem it a very great favor. "Dry earth" isn't required just at present, and I hope to escape the catlin that your kinsman, Dr. Rivinus, has been urging upon me. Perhaps you will

think that all that I need is a little more stoicism, a philosophy I find easier to preach than to practise. Yours sincerely,

Dr. Hewson. Horatio R. Storer.

Newport, R. I., April 2, 1890.

Dear Doctor: I was keeping house at Mentone during the winter of 1872 and 1873, convalescing from a tibial abscess for which I had been ineffectually trephined at home. On my way down from Germany I had a fenestrated glass splint replaced by one of plaster at Frankfort-on-the-Main, and I wore this for some time at Mentone after the tibial sinus had closed. After its removal, and from attempting too much locomotion upon my crutches, there was some return of œdema about the knee. Drs. Henry Bennett, of London, and J. Hughes Bennett, of Edinburgh, were then at Mentone. The latter I had known intimately at Edinburgh in 1854 and 1855, and he was upon the Riviera himself a patient in what proved his fatal illness. With Henry Bennett I had long had the close tie of gynæcological fellowship. My villa was the next one to his noted garden, and he visited me every day, more as a friend than adviser, while Hughes Bennett came as often as his health permitted. At no time previous to Dr. Hewson's advent was I seen at Mentone by a surgeon, nor do I think that amputation was then seriously thought of. I, myself, had at the very outset, as very often since, wished that my leg was off, to save the inconvenience. A lady friend of mine, who had consulted Dr. Hewson, urged that I should test his treatment. It was proposed to the Doctors Bennett, who were then looking after me more closely, and they permitted the trial—more, I have always supposed, from curiosity than from any sense of actual necessity. I continued slowly to improve, and three years after, having meanwhile gone through mud baths at Casamicciola, etc., etc., I laid aside my crutches for canes, then, as still, having a perfectly anchylosed knee. I felt extremely grateful to Dr. Hewson for his kind interest in my recovery. I doubt if either of the Doctors Bennett was prepared to say whether my progress was in consequence, or in mere sequence, of the earth application. My appreciation of Dr. Hewson's enthusiasm and persistence, and my friendly feeling for him, prevented my so plainly stating during his lifetime that I feared he might be building too confidently upon my case; but I confess that I have been at times annoyed when it has come to me quite directly from a number of sources that "Dr. Storer was as well as ever," and

"now had a perfectly useful knee." Dr. Hewson may, however, have prolonged my life. I do not doubt that he thought so himself, for he was a sanguine man. The opposition that he met, the unkind treatment that he received, of which we all of us know, doubtless inclined him to lay especial stress upon the personal cases of medical men.

Yours sincerely, H. R. Storer.

Dr. Morris.

His practice was large, and for some time very lucrative. But he never spared himself. He was constant and faithful to all who confided themselves to his care, whether young or old, rich or poor, white or black—they all found in him a sympathizing friend, a wise counsellor, a skilful attendant. No wonder that so many were so devotedly attached to him. But all this was not accomplished without toil early and late. Out early in the morning to visit ill patients; hurrying through breakfast to be in his consulting-room from 9 to 11 A.M.; then practising till 2 P.M.; taking a hasty dinner to be in his office till 4; then out again until 8 P.M.; his evenings occupied with meetings of societies, or writing some of his numerous publications—what wonder that even his naturally fine constitution gave way under the long-continued strain? The first seizures of the fatal malady which finally carried him off were in 1868, and may very probably be attributed to the accident mentioned by Mrs. Hewson in her letter which is appended. For a long time these seizures occurred in such a form as only to be known by a very few, and strong hopes were entertained that treatment would be successful in eradicating the tendency. But at length the occurrence of a violent epileptic spasm during a clinic at the Pennsylvania Hospital rendered their nature only too evident. He was carefully treated by his friend and physician, Dr. Da Costa, with the best remedies and methods known, but without the hoped-for result, as so often is the case. He suffered much and frequently from dyspepsia, with its depressing and trying consequences on a naturally bright and cheerful disposition.

Of an ardent temperament and fine physique, handsome features and pleasant in address, earnest in advocating what he believed to be truth, yet always willing to accord the same sincerity to an honest opponent which he felt himself, while scorning any mean subterfuge or trickery, constantly ready to place himself in the van of those using new or supposed improved methods of treatment when they commended themselves to his judgment as likely to be useful, he found himself from

time to time in conflict with the opinions and practices of those around or associated with him. That he was sanguine, and sometimes thought he saw better results from such experimental methods than others saw, is only to say that he was human. I can, however, bear testimony to the kind and Christian spirit in which he met much opposition to some of his views when we came into intercourse in our professional lives.

The following extract from his excellent address of welcome to the Jefferson alumni will well serve in delineating the man:

"The occasion naturally with us all recalls the past, and with me it brings back a crowd of reminiscences, many of which rank amongst the earliest of my life. Born and reared almost within a stone's-throw of where I now stand, and where our Alma Mater has held her sessions during the greatest part of her successful career, there are many events of her history which are indelibly impressed on my mind, even in early childhood. My memory now recalls the old yellow building, with its central entrance as it existed more than thirty years ago, and how I then managed to get into Tenth Street when the hand of the clock reached the hour, and I could see Watson, with his warm, genial face, as he rang that great, big bell, and the students run as though they were mad from the one lecture-room to the other. I remember how, as the veriest child, I have frequently, from the front window of my home, seen the founder of the College, who lived diagonally across the way, rush in and out of his house with his hands full of instruments, and have wondered what terribly big operation he had performed or was going to perform. The sensation which McClellan's boldness and dexterity created in those days must have been of a most profound character, for I recollect as it were but yesterday, the discussions which took place between my father and friends visiting him as to McClellan's courage and successes in operations such as removing the parotid and the like, which he did in those days. So it was in later times in regard to Professors Mütter's and Pancoast's operations in plastic surgery and tenotomy. Indeed, it was shortly after Dr. Mütter's first successes in the treatment of club-feet that he moved into Walnut Street, above Ninth, and I not only heard the merits of his successes freely discussed, but found it a matter of no little interest to watch those so afflicted going to his office: at first with the greatest terror depicted on their faces, and then at subsequent visits in various stages of improvement with corresponding expressions of delight and satisfaction. I not only spent the days of my childhood thus, with circumstances around me

to impress my mind with the belief that the Jefferson Medical College was the representative of a progressive spirit in medicine, and that I might be proud some day to be one of her alumni, but I had it convincingly shown to me at the very outset of my medical studies. I was present, as were many, I have no doubt, who are here to-day, at the first successful use of ether in surgery in Philadelphia. It was in this building in an operation by Professor Mütter. The letheon, as it was then called, was not pure ether, but a mixture of ether and alcohol, and was administered by Prof. T. K. Mitchell, the then professor of the theory and practice of medicine; this administration was made with a caution and prudence that would amuse the merest tyro in surgery at the present day. My father, then in his seventy-fifth year, was present by special invitation, and his conduct struck me as singularly in contrast with that of the men of his day and generation: they not only exaggerated the risk from ether, but condemned its use as an effort to evade the will of the Almighty, who had consigned us to such sufferings as part of the curse for Adam's sin; whereas, although fully appreciating that there might be danger from such an agent, he hailed its use as one of the greatest blessings, destined to disarm surgery and midwifery of all their terrors. It was my father's appreciation of the progressive spirit which pervaded the faculty of the Jefferson Medical College that then made me one of her pupils, and I have no doubt that it was the recognition of the same spirit that has made you all fellow-alumni with me here to-day. Some of you may, like myself, have had sage counsel to guide you, others of you had to form your own judgment, but with us all the one consideration was that it was here that we could learn most thoroughly the duties of our profession, and God forbid that any other consideration should ever influence the matriculation of a single individual on the rolls of the Jefferson Medical College."

He early took up the administration of electricity in the forms of primary and secondary current, and with good results, as in the employment of Hackley's chain for granular conjunctivitis in 1854. He performed amputation of the thigh at the Pennsylvania Hospital in 1865, using torsion instead of ligatures, and invented a torsion forceps.

He took up the earth treatment for wounds, contusions, chronic and acute inflammations, tumors, and for surgical dressings generally, in 1867 or 1868. Previously he had followed Dr. Goddard and others in the employment of Donna Maria gauze and collodion. He was a pioneer in dry dressings, and constantly advocated them in season and

out of season. He communicated the results of his observations freely to all the societies of which he was a member, as an inspection of their proceedings will show. In 1853 he edited, as already stated, at Sir William Wilde's request, the American edition of Wilde on *Aural Surgery*, and in 1855, Mackenzie's treatise on *Diseases of the Eye*. In both these departments of surgery he was very successful. In 1886 he added the employment of sulphuretted hydrogen gas to his earth treatment for tumors and inflammations. Of the results obtained by him I cannot now speak; he published his own views of them, and those who are more conversant with surgery than I can better judge them.

He married, November 22, 1854, Miss Rachel Macomb Wetherill, daughter of William Wetherill, M.D., who lived on Front Street above Arch, and at Fatlands, Montgomery County, Pa. Her mother was the daughter of Major Macomb, of the U. S. Army. To them were born three sons and three daughters, of whom two sons and three daughters survive with their mother to mourn his loss.

He was a devout, sincere, but unostentatious Christian—one of those who show their belief by their works rather than by words, yet always ready when asked to give a reason for the faith that is in them and is held as a priceless, sacred treasure. He was for many years a regular attendant and communicant of St. Mark's Protestant Episcopal Church.

His malady ran a somewhat varying course; at times longer intervals held out hopes of a cure, but finally a severe attack seized him on September 11, 1889, as he was going from his office to his chamber at the request of his wife, whose solicitude detected signs of some indisposition; he fell on the stairs, and, though almost instantly cared for, passed away in about an hour without recovering consciousness. His wife writes as follows:

SATURDAY, March 22, 1890.

DEAR DOCTOR MORRIS: I have endeavored to find out the date of the fatal accident to dear Addinell. I think it was in May of 1868. He was driving in a Boston gig; the horse, frightened by the children leaving school, ran away, broke the shafts from the gig, which threw Addinell against the iron bar of the gig. He came home looking pale, a bruise on his forehead; said that he was not hurt, and went to his patients on foot. He seemed perfectly well for six months afterwards, though during that time he had a great deal of anxiety and trouble. It was in October of 1868 he had his first attack. About two months

passed without any return, after that they came more frequently. As you desired me to mention anything of importance, I must tell you that just before the battle of Gettysburg, Addinell took a bullet from General Meade's side. It was not known by many persons, as General Meade did not wish his absence from the army to be noticed. He was an old patient of Addinell's, and felt that as the army surgeons had failed to get the ball, he would like to try Addinell's skill, which proved to be superior. General Meade was hardly well when he fought at Gettysburg. Addinell always thought he would not have been able to fight if he had not relieved him of the ball. I must tell you of Addinell's untiring energy. When we were first married and he was lecturing for the summer class at the Jefferson school, on College Avenue, he felt that his delivery was not the best, so he would write out his lectures and go to Mr. Wood, the old actor, repeat them and be corrected. His ambition was to be a perfect teacher. Indeed, his whole aim was to excel in every branch of his profession, so he never lost a chance of learning. I think it would be hard to find a more noble, perfect character until sickness attacked him, and even then he bore his great disappointments and sorrows without murmuring.

Very sincerely your friend, R. H. Hewson.

Shortly before the session of the International Medical Congress in Washington, D. C., Dr. Esmarch sought to meet Dr. Hewson, and wrote cordially to him, sending him his photograph.

A man of rare abilities, a Christian gentleman of thorough culture, a scientist of high rank, faithful and painstaking in every relation in his life, we can but deplore his loss from among us, and strive all the more earnestly from his example to run the race set before us, looking forward to the time of reunion, and of rewards higher than any afforded on earth.

### List of Publications.

On the Prominence of the Eyeball, with Sinking of the Caruncle and Semilunar Folds, following the Ordinary Operation for Strabismus. With an Account of a Pair of Scissors for Performing the Subconjunctival Operation. *North American Medico-Chirurgical Review*, Philadelphia, 1858, vol. ii.

On Localized Galvanism as a Remedy for Photophobia of Strumous Ophthalmia. *The American Journal of the Medical Sciences*, Philadelphia, 1860, vol. xxxix.

On the Influence of the Weather over the Results of Surgical Operations, and on the Value of the Barometer as a Guide in the Choice of the Time for and the Prognosis in such Operations, as Shown by the Results of Immediate Amputation during a Period of Thirty Years in the Pennsylvania Hospital. See *Pennsylvania Hospital Reports*, vols. i. and ii.

New Method of Making Topical Applications in the Urethra, Bladder, and Uterus.

Earth as a Topical Application in Surgery. Philadelphia, Lindsay & Blakiston, 1872.

On Various Purposes to which Earth may be Applied in Medicine and Surgery. Address before the Delaware County Medical Society. Philadelphia, Lindsay & Blakiston, 1874.

On the Treatment of Fibroids of the Uterus by Means of Dry Earth. With Outline Tracings of Three Cases so Treated, in their Various Stages of Progress. Philadelphia, 1880, Collins: and *Transactions of the American Medical Association*, 1880, vol. xxi. p. 617.

Some Recent Experiences with the Topical Uses of Earth. *Medical Bulletin*, Philadelphia, 1885, vol. vii.

Remarks and Demonstrations Concerning Sticking-plasters, as Illustrating the Importance of Accurate Attention to the Most Minute Details of Surgical Dressings. *Proceedings of the Philadelphia County Medical Society*, 1887, vol. viii. p. 63. See also *Maryland Medical Journal*, 1886–7, vol. xvi. p. 434.

The Earth Treatment for the Palliation and Cure of Abdominal Tumors. *Medical Bulletin*, Philadelphia, 1879, vol. i. p. 5.

Immense Abdominal Tumors. *Medical and Surgical Reporter*, Philadelphia, 1889, vol. xl. p. 405.

Value of Teale's Method of Forced Dilatation of the Sphincter Vesicæ in Incontinence and Excessive Irritability of Female Bladder. *Medical and Surgical Reporter*, 1879, Philadelphia, vol. xl. p. 472; *Hospital Gazette*, New York, 1879, vol. vi. pp. 243–247; *Medical Record*, New York, 1879, vol. xvi. p. 17; *Transactions of the College of Physicians*, Philadelphia, 1879, vol. iv. p. 199.

Case of Immense Abdominal Tumor. The Progress of Its Destruction, as Shown by Its History, Post-mortem and Microscopic Examinations. *Transactions of the College of Physicians*, Philadelphia, 1879, vol. iv. p. 161.

On Substitutes for Adhesive Plasters. *Boston Medical and Surgical Journal*, 1880, vol. iii. pp. 339, 457.

Rapid Breathing. *College and Clinical Record*, Philadelphia, 1881, vol. ii. pp. 65, 125.

Report of a Case of Cervical Lymphadenoma Treated by the Application of Earth. *The Medical News*, Philadelphia, 1882, vol. xli. p. 470; *Transactions of the College of Physicians*, Philadelphia, 1881–3, vol. v. p. 135.

Paper as a Vehicle for Preserving Soaps to be Used in Surgical and Medical Practice. *Transactions of the Medical Society of Pennsylvania*, Philadelphia, 1882, vol. xiv. p. 213.

Flexible Gelatine as a Substitute for Adhesive Plaster. *Transactions of the College of Physicians*, Philadelphia, 1881–3, vol. vi. p. 191.

Address of welcome to the Alumni of Jefferson Medical College on behalf of alumni, professors, and students of Jefferson Medical College.

Address of welcome to Professors Gross and Pancoast, delivered at Academy of Music, October, 24, 1868.

Some Results of Excessive Conservatism in Treatment of Disease in Large Joints. *Journal of the American Medical Association*, 1889, vol. xii. p. 147; *Transactions of the Philadelphia County Medical Society*, 1888, vol. ix.

On Polarity; Ball Detected by it and Extracted Twenty-five Years Ago. *Journal of the American Medical Association*, March, 1890. (Case of Major-General Meade, U. S. A.)

# MEMOIR

## OF

# JAMES H. HUTCHINSON, M.D.,

LATE VICE-PRESIDENT OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA; PHYSICIAN TO THE PENNSYLVANIA HOSPITAL, ETC.

By JOHN ASHHURST, Jr., M.D.

[Read November 5, 1890.]

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Quis desiderio sit pudor, aut modus
  Tam cari capitis?

HORAT., *Carm.*, lib. i. c. xxiv.

Eheu! fugaces, Postume, Postume,
  Labuntur anni; nec pietas moram
Rugis, et instanti senectæ
  Afferet, indomitæque morti.

*Ibid.*, lib. ii. c. xiv.

On the twenty-sixth day of last December, with the carols of the blessed Christmas-day still echoing in their ears, the Fellows of this College were startled and shocked by the quickly circulating rumor that their Vice-President had been suddenly stricken with mortal illness and even then lay at the point of death, and when the sun rose on the next morning it was known that their worst fears had been realized: that the active, thoughtful brain was forever stilled; that the great, kind heart had ceased to throb; and that the pure, gentle soul of their beloved colleague had returned unto the God who gave it. Friends! Fellows of the College! Let us turn aside for a brief space from the cares and duties which surround us, and recall the memory of our deceased brother, and gather, if we may, some lesson for ourselves from the contemplation of his busy, useful life.

James Hutchinson, the grandfather of our late Vice-President, was himself an eminent physician and one of the Founders of this College, and, by a curious coincidence, filled two distinguished positions—those of University Trustee and Hospital Physician—which were afterward occupied by his grandson, and the duties of which for many years engaged the latter's time and anxious thought. A Trustee of the University from 1779 to 1789, Dr. Hutchinson, the elder, in that year accepted the Chair of Materia Medica and Chemistry in the same institution, continuing to teach the latter branch until his death, from epidemic yellow fever, in the fall of 1793, at the early age of forty-one. For the last fifteen years of his life he had also been one of the attending physicians to the Pennsylvania Hospital. His first wife was Miss Lydia Biddle; his second, Miss Sydney Howell, a lady whose surname became the middle name of our late colleague, while her given name enters into that of one of his brothers, a distinguished merchant of our city. Their father, the late I. Pemberton Hutchinson, had been named after their grandfather's uncle, Israel Pemberton, an influential member of the Society of Friends in the early days of Philadelphia.

Not only by his ancestry on the paternal side was our friend thus drawn toward the medical profession, but the attraction was felt on his mother's side also, since a maternal great-uncle was the celebrated Dr. Robert Hare, likewise and for many years Professor of Chemistry in the University of Pennsylvania, and a man of great genius and originality.

Descended from such progenitors, JAMES HOWELL HUTCHINSON was born on August 3, 1834, at Cintra, a small but beautiful town near Lisbon, Portugal, where his father, then and afterward an eminent merchant of Philadelphia, was at that time engaged in business. Returning in early childhood with his parents to their home, Dr. Hutchinson was brought up and educated as an American, and yielded to no one in patriotic love and devotion to his country. His early education was obtained in private schools, notably at one in New Haven, kept by a Mr. Skinner, where he spent more than four years; the prize-papers which he received at the end of every term certifying to the studiousness, exemplary conduct, and punctuality for which thus, even in boyhood, he came to be distinguished. The line from Virgil engraved on his school-testimonials—

"Macte, novâ virtute, puer; sic itur ad astra!"

was often quoted by our friend in his adult years, and surely was never addressed to one who better merited its encouragement than himself.

Leaving school, Dr. Hutchinson entered the College Department (then known as the Department of Arts) of the University of Pennsylvania, maintaining his reputation for industry and sound scholarship, and graduating with distinction, Bachelor of Arts, at the annual Commencement in 1854. It was during his college course that my own acquaintance with Dr. Hutchinson began, but as he was a Senior Sophister while I was but a Freshman, we were not often brought together, and our friendship, sanctioned and encouraged by that of our fathers, did not become intimacy until some years afterward.

I have before me the manuscript of an oration which I well remember hearing him deliver before a large audience at the end of the first term of his senior year. The subject was "Veneration of Antiquity;" and, while deprecating a blind obedience to doctrines, or servile imitation of authors, whose age was their only merit, the youthful orator clearly showed that in his own nature there existed even then the germs of traits which strongly marked his after-life—a genuine respect for authority, and a cheerful recognition of the claims of his elders, with an entire absence of that impertinent self-assertion which so often characterizes those who are pleased to consider themselves as the progressive men of the day.

Shortly after receiving his Baccalaureate degree, Dr. Hutchinson went to Europe with his elder brother, remaining abroad about fifteen months, and thus not beginning his medical studies until the autumn of 1855. Although at that time the University, in common with other medical schools in our country, required students to attend but two courses of lectures, those whose circumstances permitted it, and who aimed at thorough preparation in their profession rather than speedy license to practise, not unfrequently attended voluntarily a third course, grading their studies so as to acquire familiarity with the elementary and fundamental branches of medical science, before endeavoring to learn their application to the practical cure or alleviation of disease. It thus happened that when I began the study of medicine in the fall of 1857, I again found myself a fellow-student of Dr. Hutchinson's, though now only two years behind him instead of three, as I had been when on the other side of the "campus."

The list of medical teachers in our city at that day embraced many illustrious names. At the University, Samuel Jackson, George B. Wood, and the elder Hodge, formed a galaxy which, for brilliancy

and deep learning, has seldom, if ever, been surpassed: Carson, my dear friend and preceptor, was teaching Materia Medica from a full mind and with true love of his subject; Robert E. Rogers, with poetic diction and striking experiment, was making Chemistry as interesting as a fairy-tale; while the junior members of the Faculty were Leidy—now its venerated senior—and Henry H. Smith; my friend and colleague, William Hunt, was recapitulating Dr. Leidy's course of instruction as his Demonstrator, and our honored President was lecturing to large classes in the old Philadelphia School of Anatomy, in College Avenue. At the Jefferson Medical College, between which and the University there existed then, as now, a friendly rivalry—or, shall I say rather, a generous emulation—Joseph Pancoast was at the height of his glory, and the elder Gross, coming to our city with a well-earned Western reputation, was beginning that long career as author and teacher which ended in placing him far beyond all competitors, and obtained for him the merited title of the "Nestor of American Surgery"; John K. Mitchell, old in fame though not in years, was just passing off the stage; Charles D. Meigs was looking forward to the rural repose in which a few years afterward he sought relief from his multifarious professional labors; and the remaining chairs of the Faculty were filled by Dunglison, lexicographer and physiologist, Bache, chemist and joint-author, with Wood, of the United States Dispensatory, and Thomas D. Mitchell. At the Pennsylvania Hospital—then the only important hospital of the city—Norris and Peace were upholding the standard of sound conservative surgery, Neill was giving his clear-cut clinical demonstrations, and Pancoast was wielding the knife all through the hot summer days with an ease and precision of movement which I have never seen equalled; while Clinical Medicine was being taught to large classes by the elder Pepper and by Gerhard—both certainly past-grand-masters in the diagnostic art—by George B. Wood, and by Levick, the only survivor of the hospital staff of that day. With such teachers and such exemplars in practice, the student was dull indeed who did not acquire enthusiasm as well as knowledge in his profession; let it be the care of the successors of those eminent men that the traditions of Philadelphia medical instruction be worthily maintained in the future.

In the spring of 1858, Dr. Hutchinson, having amply satisfied the requirements of his examiners, proceeded Doctor of Medicine at the regular Commencement of the University's medical department, his thesis being on the important subject of "The Blood"; and almost

immediately after graduation was elected Resident Physician to the Pennsylvania Hospital, where he served the full *interne* term of eighteen months. It was during this period that my own pleasant acquaintance with Dr. Hutchinson developed into warm friendship and affection—friendship and affection which but grew stronger and deeper with the lapse of time, until rudely severed by death after more than thirty years.

No period of a young physician's life is of more critical importance than that which he spends in hospital residence, for the reputation which he then gains adheres to him in after-life, and often makes or mars his future. Dr. Hutchinson showed himself in the hospital to be the same industrious, painstaking, thorough, honest worker that he had been during his student's career, and the good record made at this time went far in securing for him his appointment as Attending Physician some years afterward. Almost immediately upon the completion of his hospital service, Dr. Hutchinson again went to Europe, remaining upon this occasion two years, which he spent to great advantage in the schools of Paris and Vienna, enjoying clinical facilities which at that time could only be obtained abroad, and completing the training which was to fit him for his life's work as a medical practitioner and consultant. He also devoted a good deal of attention to Diseases of the Skin, a subject which had not then attained to the dignity of a *specialité* in our community, and on his return to Philadelphia was probably more familiar with modern dermatology than any of his contemporaries.

Coming back to our city toward the end of the year 1861, Dr. Hutchinson at once began the practice of his profession, and opened an office on the north side of Walnut Street, above Tenth Street, where he continued until the time of his marriage, a little more than two years subsequent. Almost immediately upon his return he was invited by the authorities of the Children's Hospital to take charge of its growing out-patient service, thus beginning a connection with that institution which lasted without interruption until the day of his death, when he had been for many years its senior medical officer. He also took about this time a position as Acting Assistant Surgeon in our Army, serving with great acceptance for more than a year at the Satterlee General Hospital, in West Philadelphia, then under the charge of the late Dr. I. I. Hayes, Surgeon, U. S. V.

At the age of twenty-eight, Dr. Hutchinson was happily married to Anne, daughter of Charles Ingersoll, Esq., of this city, by whom he

had six children, of whom five—two sons and three daughters—survive him; his eldest daughter, a girl as lovely in character as in person, died when just entering upon womanhood, intensely mourned by her parents, and deeply regretted by all who knew her.

Not long after his marriage Dr. Hutchinson went through a mild attack of typhoid fever, during which he was skilfully attended by Dr. Levick.

At about this time also he was elected to a vacant position on the medical staff of the Episcopal Hospital, and as, a few months afterward, I succeeded the late Dr. R. P. Thomas on the surgical staff of the same institution, our lines were again drawn together. We had the same term of service—the midwinter term—and not seldom made the journey to and from the hospital together. At that time neither of us had sufficient private practice to justify the expense of driving, and we accordingly relied upon the street cars as our means of transportation. The line which approached nearest to the hospital had its terminus more than a mile short of our destination, and from that point ran "dummy engines" over its country branch at infrequent intervals. Those were the times of "old-fashioned" snow-storms, and on bad days the "dummy engine" would not run at all, so that upon many an occasion, after going as far as the horse-cars would take us, Dr. Hutchinson and I walked the rest of the distance, plodding our way more than ankle-deep in snow, that we might make the daily visit which was expected of us, and which it was our pride never to omit. Upon one occasion, indeed, in an exceptionally heavy snow-storm, Dr. Hutchinson walked out the entire distance, fully four miles; I had been more fortunate, having struck the last car which got through; and the Superintendent, appreciating our fidelity to duty, had the market-wagon hitched up, and sent us back to town in style.

After five years' faithful service, Dr. Hutchinson in 1868 resigned his position in the Episcopal Hospital, having been chosen to succeed Dr. Gerhard as attending physician to the Pennsylvania Hospital, where he had begun his professional career as resident physician just ten years before. Here it became our friend's duty, beside caring for the patients, to deliver clinical lectures to the large classes of medical students who followed the practice of the hospital; and, although from his natural modesty, amounting sometimes almost to diffidence, this was, as I know, at first a hard task, yet he very soon acquired facility in public teaching, and for many years before his

death was recognized as one of the most successful and instructive lecturers that the hospital had ever known.

During Dr. Hutchinson's more than twenty years' connection with it, the old hospital was the scene of many exciting occurrences—as when female medical students first made their appearance in its amphitheatre, leading to acrimonious dissensions which, for a time, threatened to break up its clinical teaching—and it is not saying too much to aver that to his calm judgment and quiet but firm persistence in what seemed to him the right course, were due in no small measure the happy solution of the difficulties which had been encountered, and the turning away of the threatened danger.

In 1878, Dr. Hutchinson was elected a Trustee of the University of Pennsylvania, succeeding in that honorable position a valued Fellow of this College, the late Dr. John Rodman Paul. Placed immediately upon the Committee on the Department of Medicine, and appointed one of the Trustees' Managers on the Board of the University Hospital, the interests of those institutions, from that time until the day of his death, occupied a large portion of Dr. Hutchinson's care and attention. Indeed, to his anxiety for the prosperity of the University Hospital may be indirectly attributed the sacrifice of his life itself, since to exposure in a cold and damp cellar of the hospital-building had been due a previous attack of illness, which, though apparently entirely recovered from, evidently left the weak spot through which Death entered three years afterward.

Dr. Hutchinson early in his career became a member of the Philadelphia Pathological Society, and served it in turn as Secretary, Vice-President, and President, occupying the last-named honorable position for two years. He became a Fellow of this College in 1863; served on its Council and for many years on its Publication Committee, the latter part of the time as Chairman; was chosen its first Honorary Librarian upon the creation of that office in 1883; and at the annual meeting of 1889 was unanimously elected its Vice-President. He was also a member of the County and State Medical Societies, of the Association of American Physicians, of the American Philosophical Society, of the Academy of Natural Sciences, of the Pennsylvania Historical Society, etc. He was a Manager and Vice-President of the Pennsylvania Institution for the Instruction of the Blind, a Director of the Philadelphia Library Company, a Director of the Bank of Commerce, a Vestryman of St. James's Church, a member of the Committee on Membership of the Rittenhouse Club, President of the

Philadelphia Medical Book Club, Secretary and Treasurer of the Journal Association of the College, etc. In fact, with whatever institution or association he became connected, he was almost sure to be put forward by his colleagues into its active management, where he always took his full share of responsibility, and often more than his share of work.

As already mentioned, it was indirectly to his conscientious discharge of duty as a Manager of the University Hospital that his death was due. As chairman of the committee to which was entrusted the care of its buildings and other property, he was untiring in his attention, striving to keep every part in good order, and, at the same time, in view of the impecuniousness of the hospital, endeavoring to avoid every unnecessary expenditure. Early in the month of October, 1886, while supervising and directing certain repairs which had become essential, he stood for a considerable time in a cold and damp cellar of the hospital-building, and the next day experienced a good deal of vesical irritation, which gradually increased until, in the night of October 7, it culminated in a severe attack of parenchymatous cystitis, accompanied with much renal congestion and temporary suppression of urine. An illness of many weeks followed, during which I had the privilege of attending him, aided by the wise counsel of Prof. Da Costa, his colleague in the Pennsylvania Hospital, and his warm personal and professional friend. From this illness Dr. Hutchinson seemed to recover fully; for many months his urine, frequently examined by himself, contained a gradually diminishing quantity of albumen, but it ultimately and to all appearance permanently cleared up, and, although thenceforward he wore woollen underclothing and was careful about exposing himself to cold, he considered himself, and was considered by his friends, to have returned to his normal condition of health.

Three years subsequently, in the fall of 1889, he came back from his usual summer-vacation, which he had thoroughly enjoyed, at Bar Harbor, Maine, feeling strong, and ready to resume all the multifarious occupations of his busy life. In the latter part of November, however, or in the beginning of December, he was not so well, and presented occasional symptoms which it is easy to see now were forewarnings of the catastrophe which was to follow, but of which he himself made light, and which he readily explained away, though doubtless, if occurring in another person, his acute clinical perception and his diagnostic instinct would have enabled him to recognize their

significance. He suffered a good deal from headache, but this he attributed to the prevailing epidemic influenza, or *grippe*, of which he had had a slight attack; and he was occasionally nauseated. He consulted his early and fast friend, Dr. Harlan, in regard to his headaches, thinking that they might be connected with some ocular defect which might be remedied by a change of glasses, and assured Dr. Harlan, who asked him the question, that there was nothing wrong with his kidneys, and that, though it had not been tested recently, his urine had, when last examined, been perfectly normal.

It had been his and my custom, for many years, to walk up the street together after the adjournment of any meeting which we had both attended, and we did so for the last time after the meeting of the Council of this College on the evening of December 23. He seemed to me then to be worried and uneasy, but as I knew that he actually was worried—more than he liked to confess, even to himself—in regard to certain matters of which I was cognizant, I was not surprised. He had been attending two of my daughters, who were ill, and paid his last visit at my house on Christmas morning, when he appeared to be as well as usual. Indeed, on this, which to most men is a holiday, he did a full day's work, making his customary visit at the Pennsylvania Hospital, where it is remembered that he was even more than ordinarily bright and cheerful; seeing in the afternoon an ill patient in the country, in consultation with our colleague, Dr. Owen J. Wister; and ending the day by entertaining at dinner a large family party at his own house, being called out, too, between dinner and dessert, to visit a patient in the neighborhood. During the evening he seemed very happy, and even merry, but when the company had gone, in answer to his wife's anxious inquiry, he again complained of headache. Early the next morning, he went, as was his daily custom, to bathe, his bath-room adjoining and opening into his back office. In the latter room he was found not very long afterward, lying upon a lounge, but partially dressed, and unconscious. Carried quickly by loving hands to his bedroom, and placed in bed, Dr. Da Costa and myself were both immediately sent for. Dr. Da Costa unhappily had gone out of town, but I answered the call instantly, and was at my friend's bedside in a few minutes. At this time he could be aroused, recognizing me and answering my questions, but immediately relapsed into stupor. As Dr. Wharton Sinkler was to meet me presently at the house of another patient, a few squares distant, I obtained permission, after adopting means to combat the most urgent symp-

toms, to bring him back with me, and Dr. Sinkler thenceforward shared with me the responsibility of the case until its termination.

Familiar as I was with the history of Dr. Hutchinson's former illness, it, of course, occurred to me instantly that his condition was probably caused by uræmic poisoning, and this suspicion was but too surely confirmed by a hasty examination of his urine, which showed that secretion to be heavily loaded with albumen. For a time we hoped that under prompt and vigorous treatment our friend would rally, but we were disappointed; slowly but progressively his stupor deepened into coma—so slowly as to forbid the idea of cerebral hemorrhage, and to show that the intracranial pressure was rather due to serous effusion—and before nightfall it was evident that the end was approaching. Shortly before midnight, his friend and Rector, the Rev. Dr. Nichols, now Bishop Nichols, of California, was sent for, and not long after the midnight hour, with his hand clasped in that of his faithful, loving wife, with his family and friends clustered around his bed, and with the solemn prayers of the Episcopal Church sounding in his dying ears, his spirit took its flight. Surely a beautiful ending to a beautiful life!

"Let me die the death of the righteous, and let my last end be like his!"

On Monday, December 30, at ten o'clock in the morning, the last rites were solemnized in the beautiful parish church of St. James, before a large congregation including many representative men of other professions as well as his own, together with many of both sexes who had been bound to him by ties of gratitude and affection. The interment took place at Woodlands Cemetery.

It remains to say a few words as to our deceased friend's character as a physician, as a writer and teacher, and as a man.

As a physician, Dr. Hutchinson was equally remarkable for the painstaking care and thoroughness with which he investigated his cases, and for the constancy and untiring fidelity with with which he watched his patients through the different stages of their illnesses. *Experto crede:* He too often stood toward me and mine in the relation of the trusted family physician, for me to speak with any hesitation upon this subject. Often have I heard him remark, when question arose as to the mistakes in diagnosis sometimes made by men of wide experience, that in the large majority of instances such mistakes were due, not to ignorance, but to haste and want of care in examination;

and it was because of his habitually systematic and thorough study of his patients' maladies, that his own diagnostic conclusions were so uniformly proved correct. As a therapeutist, Dr. Hutchinson was eminently a safe practitioner. While fully conversant with current medical literature, and practically familiar with all the new remedies of the day, he was too wise a physician to abandon modes of treatment which were successful, simply because they were old, or to adopt new methods merely on account of their novelty. He did not give a great deal of medicine; and, though always ready and prompt to adopt active and even heroic measures when really essential, he judiciously preferred mild remedies in trivial cases, and, to borrow a figure from the language of war, when it was evident that the enemy could be defeated by a single regiment, did not think it necessary to bring into action a whole army-corps. As a consulting physician, Dr. Hutchinson's advice was widely sought and highly valued, not only on account of his skill, but because of the perfect candor which he exhibited toward those who sought his aid, and because of his entire freedom from those unworthy arts by which some consultants seek to ingratiate themselves with patients and their families, even to the detriment of the regular attendant. Dr. Hutchinson practised his profession at different times in four several locations: First, as already mentioned, in Walnut Street above Tenth; immediately after his marriage, in Chestnut Street above Sixteenth; afterward in Walnut Street above Twentieth; and, finally, in Twenty-second Street above Walnut, in a house which had been planned by himself, and in the commodiousness and comfort of which he took much satisfaction.

As a writer, Dr. Hutchinson was noted for the correctness and dignity of his style, saying just what he meant in few but well-chosen words, and rigidly avoiding all flowery excrescences and ambiguities of language. He never inflicted upon the profession or the public an independent volume, but he edited—and well edited—two reprints of Dr. Bristowe's "Practice of Medicine;" contributed elaborate articles, which have already become classical, on typhoid, typhus, and simple continued fevers, to the "System of Medicine," edited by Dr. Pepper and Dr. Starr; and was a valued contributor to the "Transactions" of this College and those of the Association of American Physicians; and, in past years, to the "Transactions of the Pathological Society," to the "Pennsylvania Hospital Reports," and to the "American Journal of the Medical Sciences." For more than a year he was the editor of the "Philadelphia Medical Times," in the early days of that

periodical. The skill with which he edited Dr. Bristowe's work was fully recognized by its author, who, when the second American edition was about to appear, wrote to Dr. Hutchinson expressing his "sense of the care and trouble . . . bestowed" on the first reprint, and adding: "I am gratified to hear that you will again undertake to edit my work . . . I could not wish that it should be in better hands."

As a teacher, Dr. Hutchinson became well known by the clinical lectures which he delivered weekly, from November to May, at the Pennsylvania Hospital. In the early period of his professional life he had been associated for some years with Dr. Robert Bolling and the late Dr. H. Lenox Hodge in "quizzing" and in the instruction of office-students, and many of those who then learned to appreciate his ability and thoroughness, were afterward glad to avail themselves of his skill in consultations. At the hospital, he lectured in alternation with Dr. Da Costa, and it is a proof of the excellence of Dr. Hutchinson's teaching that, although thus brought into competition, as it were, with the brilliant lectures of that gentleman, his own course was always followed by a large and attentive class of students. In fact, Dr. Hutchinson did his work in this direction well, as he did everything that he undertook, because he brought to it the same care and conscientious honesty which he exhibited in everything else. Always preparing his lectures by thorough study of his cases beforehand, he never fell into the mistake which some eminent teachers are said to have made, of delivering a discourse over the bed of the wrong patient, nor was he ever forced to fall back upon a copious flow of words as a means of concealing a paucity of thought.

In person, Dr. Hutchinson was a man of more than average height, and broad and sturdy in proportion. Until within the last few years, when he became quite gray, his hair was of a dark-brown color, slightly curling, and his beard, which he wore full, was of the same hue. As may be seen by his portraits, his appearance was not only striking, but handsome. Somewhat myopic, he used glasses for distant vision, and therefore usually in the street, though he read and wrote without them. It is not needful, however, to dwell further on his personal appearance, since this must be still fresh in the memory of all who hear me, while his features will be happily preserved for posterity in the excellent portraits of him presented by his friends to this College and to the Pennsylvania Hospital. His figure was a familiar one among us, since his duties as Honorary Librarian brought him

daily to our Hall, and few, even among our own Fellows, know how much work he did in our Library, and how much of its prosperity is really owing to his labor.

Dr. Hutchinson's mental and moral characteristics may be summed up in the words: Good sense, thorough education; truth, honesty, sincerity, gentleness, nobility of soul, love of all that was right and good, and hatred and contempt for whatever was mean and vile. What he accomplished, in his profession and out of it, has been imperfectly narrated in this brief and most insufficient record of his life; but how much nobler and greater was the MAN himself than all his work, multiform and useful as that was! To know James Hutchinson was to honor and respect him; to secure the privilege of his friendship was to love and revere him with a love and reverence seldom given to mortals to obtain.

## MINUTE.

At a special meeting of the College of Physicians of Philadelphia held on the afternoon of Saturday, December 28, 1889, to take action on the death of its Vice-President, Dr. James H. Hutchinson, the following Minute was unanimously adopted :—

The College of Physicians of Philadelphia has heard with profound regret of the death, after only a few hours' illness, of its Vice-President, Dr. James H. Hutchinson, and hereby records its profound sense of the loss—to human eyes irreparable—thus occasioned, not alone to its own body, but as well to the whole Medical Profession of the city and vicinity, and to the entire community.

Still in the prime of life, with skill and knowledge broadened and confirmed by wide and ever-growing experience, Dr. Hutchinson shone pre-eminent both as a faithful and trusted family-physician and as a consultant whose advice and assistance were largely sought for and highly prized by his fellow-practitioners, all of whom recognized both the value of his counsel and the uniform candor and conscientious honesty with which it was bestowed.

A Fellow of this College for more than the quarter of a century, he served it in Council and Committee-room with a zeal and fidelity which are amply witnessed by its "Transactions" and by the records of its Library, and which but met with just recognition in his unanimous election to the honorable office of Vice-President.

A scholarly and accomplished writer, an able clinical teacher, a skilful and judicious practitioner—well exemplifying the highest and best type of the practical physician—a high-minded, honorable Christian gentleman, tried and true in all the various relations of an active, busy life, his death leaves a gap which never can be filled; a precious memory which will endure long after those who now grieve for him shall themselves have passed away forever.

# A SKETCH

OF THE LIFE OF

# CASPAR WISTER, M.D.,

WITH NOTICES OF HIS ANCESTORS.

By W. S. W. RUSCHENBERGER, M.D.

[Read November 5, 1890.]

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Theories of heredity imply that the foundation of the natural characteristics of a man, structural and mental, is laid and gradually evolved by his ancestors very many decades before his birth; and that a detailed record of the natural qualities of his lineal predecessors might enable an expert in the premises to foretell the general character, if not the fortune of the newly-born infant, as satisfactorily at least as any forecast made by astrologers of old. In the present state of our knowledge of the complex operations of heredity, this suggestion is manifestly premature, and not likely to be realized.

Professor James H. Stoller says, in an essay on *Human Heredity*, "All the qualities of our human nature come to us by inheritance."[1] And Dr. Oliver Wendell Holmes says—*Over the Tea cups*—" What he is by nature is not determined by himself, but by his parentage."

The accuracy of this assumption may be questioned. Even if exact, the inheritance is unequally and irregularly transmitted. Of many children of the same parentage, born and reared under the same circumstances, all of normal stature and intelligence or above, sometimes one is unaccountably an ingenious dwarf, or an idiot physically well developed, or misshaped, "scarce half made up."

Dr. August Weismann says, in his essay on the *Duration of Life*, "We know that long life is hereditary." And yet all the children of

[1] Popular Science Monthly, July, 1890.

octogenarian ancestors do not uniformly attain advanced age, although all alike live under the same influences. Some of them do not reach adult years.

Notable fecundity, and other natural qualities of ancestors, are not always transmitted to their descendants.

The sons of eminently great fathers are not always endowed in any respect above the average of men of their class and time. And very frequently the sons of clergymen are neither naturally fitted nor inclined to follow their fathers' examples. The ancestors of distinguished men are often obscure people. For instance, Benjamin Franklin. His remote origin has been traced to a family of the name, in which a farm was owned for three hundred years or more at Ecton, in Northamptonshire, sixty-six miles from London. The eldest son regularly inherited the farm, and was always a blacksmith. All males of the family worked at the same or other trades. Josiah Franklin, father of the Doctor, about 1685 came to Boston with his wife and three children. Lack of custom and profit in his trade of dyer, induced him to become a tallow chandler and soap boiler. In 1689, when he was thirty-five years old, his wife died, soon after the birth of their seventh child. Within a year he married Abiah, youngest daughter of Peter Folger, "a learned and godly Englishman." Dr. Franklin was one of their ten children; and possibly may be indebted to the Folger stock for some of his natural endowments,[1] mental and physical. Be this as it may he far out-measured in every sense his uterine fellows.

On the other hand peculiar qualities so fully characterize members of the same family that their kinship is easily recognized. Dramatic talent often runs in a family through several generations, but not always. And in many instances musical talent in like manner seems to be an inheritance.

Observation shows that criminal classes include numerous squads of blood relations, sires and sons. This feature in heredity seems to be so clearly determined that it might be accepted as a conclusive reason for diminishing the number of criminals in the future by legally requiring that every person, male and female, on admission into a prison on a second conviction of crime should be at once anæsthesitized and permanently sterilized by the surgeon of the institution, as the

[1] Life and Times of Benjamin Franklin, by James Parton: Mason Brothers, New York, 1864.

initiatory, radical means of their reformation. Such an economic application of a doctrine of heredity might be opposed by those who do not believe in it, as well as by those whose clemency for criminals makes them forgetful of the welfare of honest people.

Besides virtues and vices, according to both popular and medical opinion, diseases are inherited. Insanity, gout, drunkenness, tuberculosis run in families from parents to children. The inheritance of tuberculosis may be now considered questionable by some since hosts of observations, it is asserted, demonstrate that tuberculosis is a specific infectious disease, caused alone by the bacillus tuberculosis. But in spite of the earnest, ceaseless and praiseworthy labors of Dr. Koch and many others during several years, to ascertain the origin and habits of this bacillus with a view to discover means for its destruction, it still carries on its ravages with impunity; and notwithstanding the indictment found against it by most astute detectives, the mortality from tuberculosis remains unchanged.

The many problems of heredity remain to be solved. Mr. Francis Galton, who has studied the subject during the past quarter of a century and published several essays and books about it, says, in his last work, that "no complete theory of inheritance has yet been propounded that meets with general acceptance."[1]

And Dr. August Weismann says, "I am unable to indicate the molecular and chemical properties of the cell upon which the duration of its power of reproduction depends; to ask this is to demand an explanation of the nature of heredity—a problem the solution of which may still occupy many generations of scientists. At present we can hardly venture to propose any explanation of the nature of heredity."[2]

And recently it has been asserted, that we of the present generation are wrong to be unconcerned for the physical and mental qualities, not only of the next but of all generations in the remotest future. Heredity and evolution, in obedience to the will of the omniscient Creator, have wrought alone from the beginning, to increase, raise the physical and mental powers of the human race from the lowest level to the highest degree of excellence; but now, the coöperative assistance

[1] Natural Inheritance, by Francis Galton, etc.: Macmillan & Co., London and New York, 1889, 8vo., pp. 259.

[2] Essays upon Heredity and Kindred Biological Problems, by Dr. August Weismann, Professor in the University of Freiburg in Breisgau. Authorized Translation, edited by Edward B. Poulton, M.A., etc., Selmar Schönland, Ph.D., etc., and Arthur E. Shipley, M.A., etc., 8vo., pp. 455. Oxford, At the Clarendon Press, 1889.

of all men of to-day is needed to prevent the rate of progress from being lessened. Over-work of all kinds, and many other excesses are impairing our vigor, and for this reason it is a duty to secure for ourselves, by appropriate hygienic means, the highest degree of physical and mental force attainable for the benevolent object of transmitting the same to our posterity.

Accepting an assumption that the characteristics of man may have come to him through the functions of reproductive cells in the bodies of remote ancestors, this sketch of the life of Dr. Caspar Wister begins with brief notices of his great-great-grandparents and their lineal offspring.

The family names, Wister and Wistar, have been traced back about two centuries.

### The Great-Great Grandfather of the Wisters.

Hans Caspar Wüster, and his wife, Anna Katarina, resided at Hilsbach, a village seventeen miles S.S.E. from Heidelberg, in the Duchy of Baden. He was Jäger, that is, Hunter or gamekeeper of the prince Palatine—a prince entitled to privileges in the palace.

The Rector of the Lutheran church at Hilsbach has in his keeping a book in which are recorded the baptisms of the parish, from 1699. The register used in the church for the purpose prior to that date had been accidentally consumed by fire. This one contains the names of five of their six children, with the date of birth of each. The name of Caspar, the oldest, is not in it, because he was born February 3, 1696, before the Rector's old church book was opened for entries.

Though not recorded, it seems fairly supposable that Hans Caspar and his wife knew who were their parents, grand parents, and great grand parents, though comparatively obscure people, and for this reason it may be admitted that knowledge of the family existed as far back at least as the middle of the seventeenth century. Unfortunately, the individual characteristics of Hans Caspar and his ancestors have not been recorded.

Theories of evolution and heredity suggest that all pedigrees started alike and at the same time with the beginning of the human race, and that, under natural law, their growth and duration were the same. In this condition of perfect equality in this respect, every one knew that he had forefathers as a matter of course, and did not appraise himself more highly than his neighbors on that account. In the course of

time, however, views changed and men were pleased to believe they were better for the virtues of parents. Then it came to be conventionally agreed that a pedigree worthy of mention must be traceable through a line of ancestors, each being named with his relative position and connection in the line clearly designated. Therefore, the value of a pedigree is commensurate with the length of the period during which it can be traced.

As early as 1683, William Penn invited Mennonites in Holland, Germany, and elsewhere to settle in the new country, and offered to sell them land in his province. Numbers accepted the invitation, and, to escape persecutions they suffered from religious intolerance at home, became valuable citizens of the English colonies. Among the early Mennonite settlers in Germantown were many weavers. The Friends and the Mennonites were peaceable neighbors; both sects conscientiously believing that war and bearing arms under any circumstances are repugnant to their sense of religious duty.

These immigrants no doubt reported to their kinsmen and friends in Europe the advantages of living in America in a manner to induce many to follow them.

Caspar, the eldest son of Hans Caspar, dissatisfied with the aspect of the probable opportunities to increase his means of livelihood in Germany, started, as soon his age authorized him legally to act independently of his father, to seek better chances of happiness and fortune in the new world. He arrived in Philadelphia September 16, 1717. His Jäger rifle, which he brought with him, is still an heirloom in the family.

When Caspar Wüster settled in Philadelphia the inhabitants were subjects of George I., King of England, and were English in their modes of thinking, their political affiliations and language. According to a family tradition his name was anglicized by his American associates. As he spelled it aloud as he had done in his native land, they substituted in place of the German *ü*, marked by an *umlaut*, the English *i*, which letter in sound was supposed to approximate nearest to his pronunciation of it; and for like reason, the German *e* was superseded by the English broad *a*, and so they wrote his name Caspar Wistar; and concordantly he signed his oath of allegiance to King George I., in 1721.

In the first years of his residence in Philadelphia he carried on the business of button-maker, and was successful. The Colonial Assembly enacted a law "for the better enabling Caspar Wistar and John

Crapo, merchants, and Nicolay Gateau to trade and hold lands in the Province." He and other born subjects of the Emperor of Germany had petitioned for such legislation, April 27, 1724. The *Weekly Mercury*, in 1726, recorded him among "the principal merchants of the city."

He purchased land where North Broad Street and the Ridge Avenue are now; some of it is still owned by his descendants.

In 1726 he married Katherine Johnson of Germantown. His son Richard, born in 1727, the eldest of his seven children, married in 1751, Sarah, daughter of Bartholomew Wyatt, of Mannington township, Salem County, N. J. He bought between two and three thousand acres of land in that county, and established, about a mile and a half from Allowaystown, a glass factory, said to be the first in this country. The immediate management of it was confided to a superintendent, for the reason that he resided in Philadelphia.

He had eight children. One of them was Dr. Caspar Wistar, the eminent professor of anatomy in the University of Pennsylvania, and the fourth President of the American Philosophical Society—from January, 1815, to January, 1818.[1]

As soon as his observation and experience had satisfied him that Philadelphia afforded better opportunities than Hilsbach for a young man to seek a fortune, Caspar advised his younger brother John to settle here without delay. John, however, declined the invitation, because he was not willing to leave Germany while his father was living.

Not very long after the death of Hans Caspàr Wüster, January 13, 1726, and about the time that George II. became King of England, June 11, 1727, he left Hilsbach, and, at the end of a four months' voyage, landed in Philadelphia, September, 1727, in the nineteeth year of his age. He was born November 7, 1708.

These two brothers, who were the founders of the Wistar and Wister families of Philadelphia and New Jersey, probably had no more education and training at home than were usually given to hunters and gamekeepers in Germany at the beginning of the eighteenth century.

[1] History of the Counties of Gloucester, Salem and Cumberland, New Jersey, with Biographical Sketches of their Prominent Citizens. By Thomas Cushing, M.D., and Charles E. Sheppard, Esq. Quarto, pp. 728. Everts & Peck: Philadelphia, 1883.

## The Great-Grandfather of the Wisters.

Besides robust health, good sense, a cheerful disposition, honest and industrious ways, John brought with him little, if any, capital. He soon found employment.

He was so prosperous that he was able in 1731, to purchase an extensive plot of ground on the north side of Market Street, between Third and Fourth Streets. It was overgrown with blackberries. These he converted into wine, and sold it so well that he was induced to become a wine merchant, at first on a small scale; imported wines from Germany. and prospered in the trade. Subsequently, however, he dealt exclusively in drygoods.

He attended closely to business, was thrifty and invested his savings preferably in real estate. He built a store and dwelling on his Market Street property; bought land in Germantown, part of which is still known as Wister's woods, and a tract on the main street, upon which he constructed, in 1744, a fine large house for his family residence in summer.

The Market Street house, now No. 325, was among the first in the city in which Dr. Benjamin Franklin, who was among the acquaintances of John Wister as well as of all good citizens of the time, about the year 1753, erected a lightning rod—a hexagonal iron rod—still in possession of the family—which was so connected with a bell that it rang whenever the atmosphere was locally surcharged with electricity. The ringing of the bell annoyed Mrs. Wister, who entertained a notion, then not uncommon, that a lightning rod was in some manner sinful; —"an impious attempt to 'control the artillery of Heaven,'"[1]—and at her instigation was after a time removed.

Simple in his manners and tastes, John Wister gave his leisure to books; was benevolent, disposed to be religious. He sent money to relatives in Germany; for a time, he had bread baked in his kitchen to be distributed on Saturdays to destitute applicants for it at his door; and, in 1760, he contributed his quota towards founding the Germantown academy.

He married, February 1731, Salome Zimmerman of Lancaster County, Pa., who died at the end of five years. Of their four children only one, named Salome, reached adult age.

[1] See, Life and Times of Benjamin Franklin. By James Parton. New York, 1864, vol. i., p. 294.

Anna Catherina Rubenkam of Wanfried, Germany, became his second wife, November 10, 1737, and lived till May 17, 1770. Three of their five children attained mature age.

His third wife, a Moravian nun of Ephrata, was without issue.

While a British army occupied Philadelphia he wrote to his granddaughters, Sally and Betsy, then at Gwynedd, July 6, 1777, "I am not at liberty to visit you because I cannot take the 'Test,' and I am afraid to venture for fear of being arrested and committed to jail. I intend therefore staying at home.

"Do not be ashamed to learn to do any country work; if you do not want to do it hereafter you can always let it alone. There is no shame in learning to do anything that is useful."

Again, December 22, 1777, he wrote, * * "I cannot at present send you anything, for the merchants will not sell their goods but for hard money; and hard money I have but little of * * * We cannot buy provisions for old or for Congress money here in town.

"But, my dear children, if the Lord grants me health till next spring, I then intend to buy cloth and other necessary things for you all. I then hope that old money will pass again.

"They have quartered a Cornet and his wife, and a white man and a negro, besides three horses and a cow upon me.

"They have taken the three best rooms in my house, and I must now live in the back building. It most kills me to be so ill-treated in my old age, that I must give up my own bedchamber, which I have occupied nearly thirty years to a stranger. I have very little rest, day or night besides."

Nevertheless, he survived these annoyances several years.

His last illness of six days, during which his faculties were unimpaired, was passed without a murmur. He died, January 31, 1789, in the eighty-first year of his age. His remains were buried in the Friends' cemetery, at Arch and Fourth streets.

He bequeathed his estate to his children.

It is conjectured that John Wister opportunely trained his sons Daniel and William, as well as his grandson John, to the dry-goods trade, and at the proper time admitted each to a share in it. As the sons were partners in the firm at the time of their father's death, they jointly continued the business.

William Wister, who was born March 29, 1746, died unmarried in 1800, in the 54th year of his age. It is stated as evidence of his good standing in the community that the Provincial Assembly appointed

him with his kinsmen Owen Jones, Jr., and Col. Samuel Miles, to endorse the paper currency of the time.

### The Grandfather of the Wisters.

Daniel Wister, son of John and his second wife Anna Catharine, both of German birth and parentage, was born at No. 141—now 325—Market Street, Philadelphia, February 4, 1739.

He was educated in the Moravian College at Ephrata, Pa. His classical attainments were good. Besides German, he understood other modern languages.

His temperament was kindly and cheerful; his natural disposition genial, social, a *bon vivant;* and he possessed so much of the sportsman's spirit as to be interested in owning horses, dogs and cats. He had many caged birds in his house. At times their singing was so noisy and discordant that it was usual to silence the birds by covering their cages to enable persons at meals to hear each other talk.

Like his father he was successful in business.

He married, May 5, 1760, Lowry, a daughter of Owen Jones, (who was Colonial Treasurer), and his wife Susannah, of St. Mary's and Wynnewood, Lower Merion, Pa., and so crossed his German with a good Welsh breed of the Society of Friends, They had nine children, namely Sarah, Elizabeth, John, Hannah, Susan, John, William, Charles Jones and William Wynne. Some of them died in infancy.

In Sept. 1777, he moved his family to Gwynedd, North Wales, Pa. where his daughter Sarah, then a sprightly girl of fifteen, commonly called Sally Wister, kept a diary addressed to her friend Deborah Norris, beginning Sept. 25, 1777, and ending June 20, 1778. This interesting journal, kept during an exciting period of the Revolution, has been published in the *Pennsylvania Magazine of History and Biography.* She as well as all of his descendants, with rare exceptions were endowed with a poetic vein and wrote rhyming letters; and some of them had a taste and capacity for music.

Daniel Wister died Oct. 27, 1805 in the sixty-seventh year of his age. During the last few days of his life he was mentally astray and talked only in Latin.

### The Father of Dr. Caspar Wister.

Charles Jones, the eighth child of Daniel and Lowry Wister, was born, April 12, 1782, at the Market Street home; and died July 23, 1865, in the 84th year of his age.

In virtue of his birthright in the Society, derived from his mother, at the age of nine years he entered a school established, at the time, on Fourth Street south of Chestnut Street, by members of the Society of Friends. English, mathematics and the classics were taught in the school. He studied French under Monsieur N. G. Dufief, author of *Nature Displayed*, etc., a prominent teacher in his day, and German under Herr Giese. In the summer time he attended the Germantown Academy. He was a merry, mischievous boy, and wrote verses at the age of twelve.

In 1799, in his seventeenth year, he was apprenticed to his uncle William to learn the ways of the dry goods trade.

It was a duty of the apprentice to go at least once a year on horseback to places in Pennsylvania, Maryland, and Virginia to collect debts to the firm. As payments were made in coin which was carried in his saddle-bags, he was not always free, during those journeys, from apprehension of highwaymen.

While travelling on those collecting tours his sisters, Sally and Betsy, occasionally cheered him with rhyming epistles, sometimes jocularly alluding to his scientific and literary tastes.

For instance, Sally wrote:

"From coatings, cloths and bombazines,
Modes, ribbons, chintzes and moreens,
Say, does not oft thy fancy rove?
* * * * * * *
Or, when in packing box thou'rt placed
With all mercantile powers graced;
Surrounded half way to thy neck,
With callimancos, muslin, check,
Say, is thy active roving mind
Chained to the spot where thou'rt confined?
Or does it wander, day by day,
To chemistry or algebra?
Say, does the microscopic wonder
Keep merchandizing tumults under?
Or, does the bright electric fire
Bid all inferior thoughts retire?"

Again, his sister Elizabeth, commonly called Betsy, who often contributed stanzas to the Portfolio, wrote to him, with other lines:

"While fancy paints and wishes roam
We strive to fix content at home;
Yet wishes warm and fancies free
Are wafted from our hearts to thee.
Oft times, a social hour we spend
In converse with a favorite friend.
We talk of women, books, and men
But not a word of *oxygen.*
No chemical discussion passes—
The alkalies and all the gasses,
Till thy return, are laid aside.
Yet then, I trust, we shall compare—
With sage experience for our guide—
The different properties of *air,*
Whether 'tis best, at home abiding
When chilling northern blasts prevail,
Or, over hills and mountains riding,
To catch fair Nature's purest gale—

"My vein of rhyme is exhausted. When I write again, it will, I trust, be at full tide."

Mr. Charles J. Wister, in 1801–2, attended a course of lectures on chemistry by Professor James Woodhouse in the University of Pennsylvania, then on Fourth Street, south of Arch Street, not far from his own residence. Influenced by a notion that he might adopt medicine as his profession, he at the same time attended some of the anatomical lectures of his kinsman, Dr. Caspar Wistar.

Immediately after the close of the chemical course he arranged to continue his study of the subject experimentally with Dr. Adam Seibert, a German apothecary and chemist, recently established in his neighborhood. The doctor, who was also a mineralogist, had brought with him from Germany a cabinet of European minerals, the first imported to this country.[1]

Perceiving how useful and convenient such a cabinet, for reference, must be to the student, Mr. Wister at once began to form a similar collection for himself; and in the course of a few years made it in quality and interest second only to Seibert's. He had gathered from

[1] Dr. Adam Seibert's cabinet of minerals was bequeathed by his son Henry to the Academy of Natural Sciences of Philadelphia.

their natural positions specimens of all minerals he could find within thirty miles of the city, and had become a working mineralogist. In this connection it seems proper to mention that in 1814 he attended a course of lectures on mineralogy delivered in Philadelphia by Professor Parker Cleaveland, of Bowdoin College, and was ever afterwards his friend and correspondent. In the second edition of his *Treatise on Mineralogy*, 1822, Professor Cleaveland cites him as authority for the localities of many minerals.

In 1803, about the beginning of the twenty-first year of his age, he succeeded his uncle in business under the firm name of John and Charles J. Wister.

The Friends informed him, November 25, 1803, substantially that he had forfeited his birthright in their meeting, because he had paid a State militia fine.

He married, December 15, 1803, Rebecca, a daughter of Joseph and Esther Bullock. She died September 20, 1812, leaving him four children. Two of them are still living.

His mother, Lowry Wister, died February 15, and his sister Sally April 28, 1804.

In a newspaper notice of these two ladies Dr. Benjamin Rush, who was at the time the family physician, said: "Few families have ever furnished two such shining examples of prudence, piety and eminent acquirements."

In 1812, in the early summer, Mr. Wister moved to the Germantown homestead, which his uncle William had bequeathed to him, and continuously resided in it ever after.

He married, December 4, 1817, Sarah, a daughter of John and Sarah Whitesides, by whom he had three sons and three daughters. She died in her seventy-first year May 31, 1869.

In 1819, he and his brother John retired from business; and both were permanently settled in Germantown.

At that period and for several years after the Germantown and Norristown Railroad was opened, 1831, Germantown was a suburban village, mostly built along the main street in the midst of farms on either side of it. The Wister homestead had connected with it a large garden of fruits and flowers, a barn and farm of many acres under cultivation. To his many occupations the proprietor added, in 1824, the care of bees and in time became a noted bee-master.[1] Besides

[1] See, American Quarterly Review, June, 1828. Carey, Lea & Carey, Philadelphia.

horticulture, bee culture and agriculture, in which he was much interested, he had other pursuits.

From May 7, 1810, he was a trustee of the Germantown Academy, Secretary of the board from May 3, 1813, till 1842 when he resigned, having been active in all its affairs during thirty-two years.

He delivered a course of lectures on mineralogy and geology in the winter of 1820–21; and a course of lectures on chemistry in the winter of 1821–22, free to the pupils of the Academy but others were charged a small fee for the course. The net proceeds of both courses were spent in the purchase of globes, maps, etc., etc., for the Academy.

He was a director of the Bank of Germantown, during fifty years from its foundation 1814, till his death, and Secretary of the board thirteen years, till Nov. 18, 1827. He was also for many years a manager of the Perkiomen Turnpike Company.

Yet, his serious occupation was the study of botany, mineralogy, mechanics, astronomy.

He was chosen a member of the American Philosophical Society Jan. 1811; and the Academy of Natural Sciences elected him a correspondent in 1814.

His familiarity with plants indigenous to the city region and country surrounding it brought him into pleasant intercourse and correspondence with prominent American botanists. They were pleased to consult his herbarium and visit his garden.

At the back part of his dwelling he constructed, 1819, a workshop which was in time furnished with turners', clockmakers', carpenters', engravers', blacksmiths', tinsmiths' tools and implements which he skilfully used. In this shop he spent much of his time, especially in bad weather. He turned tops for the boys preferable to any they could buy; mended his neighbors' clocks, made mechanical puzzles, etc., etc. He delighted in clocks, possessed many, no two exactly alike, and found pleasure in keeping them so regulated that they harmoniously struck the hours.

Mr. Isaiah Lukens, a well known clock maker, machinist and mineralogist, who was an intimate friend, passed many an hour with him in the workshop; and sometimes Mr. Joseph Saxton—notable for his sensitive modesty—also an intimate, joined them. He was an eminently ingenious mechanic, who had devised and constructed improved machinery for the U. S. Mint in Philadelphia. He invented an automatic ruling machine for accurately engraving coins and medals of all kinds; and for many years up to the close of his life,

he had charge of the standards of the weights and measures of the United States in Washington.

Mr. Wister's interest in clocks and their regulation rendered the possession of means to ascertain time accurately very desirable. Accepting the suggestion of his friend he built an observatory in 1835; and Mr. Lukens constructed and set up in it an astronomical clock and transit instrument.

They observed a transit of Mercury in 1845, and reported their work to the American Philosophical Society.[1]

To what degree, if any, his home surroundings had a formative influence on the character of Dr. Caspar Wister is uncertain, purely conjectural.

## Dr. Caspar Wister.

Caspar Wister, the first child of Charles J. Wister and his second wife, was born Sept. 15, 1818, in the Germantown homestead.

At an early age he was sent to a day-school kept by Miss Rooker. In 1828 he entered the Germantown Academy and remained in it five or six years.

Germantown was still a village. The deportment and ways of many of the boys while out of school were not satisfactory. Caspar had never been much restrained at home; was somewhat insubordinate, irascible, self-willed; and was probably a popular leader in mischievous pranks among his playmates.

He was in his sixteenth year when it was determined to remove him entirely from the influence of this connection. His father, accompanied by his mother, took him in his carriage to West Chester, and entered him there, June 4, 1834, in the Institute for Young Gentlemen, a boarding school, the proprietor of which, Mr. A. Bolmar, managed his pupils so judiciously that they properly observed the rules of his establishment, and the most wayward boys soon became amenable to discipline.

The correspondence between Caspar and his family portrays the prominent features of the boy's character, as well as the affectionate nature of the inmates of his happy home. It suggests that every thing there was redolent of harmony, the special interests of one being the common interest of all. While out of school each of the juveniles had

[1] Labour of a Long Life; A Memoir of Charles J. Wister. By C. J. W., Jr. 2 vols. 8vo., pp. 200–210. Germantown, 1866. This memoir, printed for private circulation only, is the authority for many facts and dates.

his petty occupation. A flower patch in the garden, with pet chickens, or pigeons, or canaries, or cat or dog were cared for; and the swarming of bees was a notable event. In the evening all gathered around a table in the sitting-room, the ladies with their sewing and the boys with their lessons; and, when the sky was clear, they were out o' doors observing the stars under their father's instruction.

Those letters, commonplace as they are, bring quite pleasantly into view the varied surroundings—supposed to exert a formative influence on character—amidst which he grew from boyhood to full maturity; but little more than allusion to them can be made.

The day after returning to Germantown, June 6, his mother wrote to him about the homeward journey by way of the Yellow Springs and Norristown, where they lodged, and at the close of her letter, said;—"I hope you are pleased with your school," etc.

His sister Mary wrote to him June 9:—"We miss you very much although you were such a plague, etc.;" and his father, June 11, substantially that all his boyish faults had passed from his memory.

In his first letter from West Chester, which is without date but postmarked June 13, Caspar addressed his father and mother jointly, and said;—"I received your letter on Sunday last and was very glad to get it. * * * Tell Mary I received her letter this morning and was much pleased with it. * * * I have a bed to myself but there are six of us in a room. They keep as good a table as we have at home. * * * On Saturday afternoon we all went into the woods. We get up at five o'clock every morning which makes the day so long that it seems as long as a week did at home. * * * We have four teachers * * A cloudy day makes me so homesick I can hardly talk. This is a great place for birds in the morning from five till about eight o'clock. The robins are singing all around us, and sitting all around on the fences and tops of the trees and chimnies. Give my love to all and write often. I remain your affectionate son,

"CASPAR EDMOND WISTER."

At the time he was named some proposed to call him simply Edwin and others, Caspar. After fairly considering the subject, it was agreed by those interested that his name should be as he signed his letter. But a few years afterwards Caspar himself dropped Edmond.

In a letter, June 27, it is stated in substance that a cousin in the sophmore class told his father it was wrong to send him to a boarding-school—that he ought to have gone to the University, because there the boys need not study unless they please.

Caspar wrote July 18;—"I have been in West Chester more than a month and it becomes more natural to me. We had no school on the Fourth, and we went morning and evening to the Court House and heard the Declaration of Independence read and several orations delivered by some of the young lawyers of the place. In the morning it was read by a little boy not as big as Owen * * * * On Saturday we went out the Strausburg road to the Brandywine to swim. It is a beautiful place and we had a very pleasant time. I found some flowers that I dont think you will know. I have tried to dry them to take home with me * * * I have seen but one stand of bees since I have been here. It consisted of about eight hives in the old German style of boxes. I have discovered a great difference between my letters and those of the other boys. Theirs contain *five dollar notes,* and there are none in mine, which is a great difference. I want to buy a small box to put minerals and such things in and keep in my trunk * * * N. B. remember, five dollars."

Caspar was at home during the August vacation.

He wrote to his father and mother Sept. 24;—"I arrived here safe after a very pleasant ride on the Columbia rail road, at about half after six o'clock. Mr. Bolmar did not expect that I would return. * * * I have been attending a course of lectures on astronomy. * * * I wish you would get my *Græca Minora* of Will."

A request often repeated to date his letters provoked Caspar to write, "Letter begun Oct. 25, and finished Nov. 8, half past ten in the morning." He was dissatisfied with the school fare. "Bolmar gave us for dinner the other day pies made of green tomatoes served and sweetened the same as apple pies. They were the worst things I ever tasted. * * * Received the *Græca Minora* safe and sound, Saturday in October. * * * No Christmas presents this year. We rise before the sun every morning and breakfast at 7. The rest of the day is passed [as] formerly."

In a letter, Dec. 8, 1834, his father gave a detailed account of an eclipse of the sun, observed Nov. 30, by himself, Lukens and Charley.

Caspar had passed the Christmas holidays at home. He wrote to his father and mother, Jan. 15, 1835;—"I am once more in this horrid place, now doubly so since seeing you. From the day of my arrival till about three days ago I have been terribly home sick, but am now nearly well. * * * All here is very different from home, especially the eating. It is worse than you have any idea of, especially the bread and butter."

Caspar wrote Feb. 13, that he had received a long looked for letter —that except from his father and Mary he had not received a letter from any member of the family since his return, more than a month—that he had attended lectures on phrenology, and witnessed interesting experiments in natural philosophy and chemistry.

"And now, my dear father, I want to consult you about my studies. I think when I have finished *Græca Minora* to give up the study of the Greek language and in place of it to attend closely to mathematics and Euclid," etc. etc.

In a letter to his mother, March 7, Caspar said;—"I now proceed to answer some of your questions. I have not touched a card in play since I have returned, and have thought of the five-dollar note you spoke of if I would give up the same. It would come very *à propos* at present, as I have but *one cent and a half.*"

His father wrote to him, March 22, substantially that he had received a letter from Mr. Bolmar the other day enclosing his bill, and was greatly rejoiced to hear from him that he had conducted himself with much greater propriety than heretofore, and that, as a small return for Mr. Bolmar's report about card-playing, he enclosed a bank note, which he did not doubt would make this letter the most agreeable he had received.

Caspar replied March 28, 1835.

"I received your very interesting letter last week, and I assure you it was the most interesting that I have ever received since I have been in West Chester. I do not care how many such letters you send me. They will always be agreeable. You cannot think how proud I felt when I got it for the first time in my pocket."

July 5, 1835, his father wrote to him in substance that Bolmar said that he learned something, but was too fond of promiscuous reading.

Caspar wrote August 13, 1835:—

"It has been a very long time since I have written to you, but I have been prevented by my accident, which kept me in bed three weeks." He relates that while playing ball in the yard he fell upon a piece of a porter bottle, and received a wound on the back of his thigh, an inch and a half deep and two and a half inches long.

"I dont know why Charles should want to go to boarding school. He had better go to the House of Refuge I can tell him. If ever he goes he will soon wish to be at home," etc.

Probably Caspar spent the Christmas vacation of 1835, at home and

did not return to West Chester. In order to qualify himself to be a land surveyor, a vocation which he had chosen for himself, he early in the year 1836, entered a boarding school, of which the Rev. S. Aaron was principal, at Burlington, N. J. His time there passed pleasantly.

In a letter to his father and mother May 23, 1836 he says;—"Tell Charley; last night I swam the Delaware and was not more than twenty minutes in reaching the Pennsylvania shore."

He addressed them again August 21st.

"There are so very few occurrences taking place in Burlington worthy of being committed to paper that, when the postage of my letter is considered, the value of these incidents is so very much below that of sixpence, that I cannot write often through motives of economy. * * * I go a boating very often indeed. I never yet found any thing so pleasant as rocking in a boat out in the river about sunset, just when the moon begins to silver the water, and the blue hills of Pennsylvania to grow indistinct in the distance. I sometimes go over to Bristol of a Saturday afternoon and lounge about, and see the people and the coal come down the Pennsylvania canal, or the New York passengers on the Trenton Railroad. * * * * I shouldered the chain the other afternoon and went out with Mr. Aaron to survey one of the curves on the railroad."

His school days ended, Caspar resumed his residence at home, about the close of 1836, prepared to serve the public as a land surveyor. Two years were passed, trying to obtain profitable employment in his profession, but with little encouragement.

December 4, 1838 the Legislature of Pennsylvania assembled at Harrisburg. The genuineness of certain election credentials from some districts was questioned, their legality disputed. Two Houses of Representatives were formed. Each claimed that it alone was lawfully constituted. The Senate refused to recognize either. A mob of three or four hundred Democrats, sent for the purpose, it was asserted, had possession of the Capitol. Their turbulence was so alarming that a Senator escaped through a window of the Senate chamber.

The turmoil became so great that Governor Ritner, apprehensive of bloodshed, proclaimed the existence of rebellion, and required General Robert Patterson who commanded the first division of volunteer militia of the State to furnish troops to keep the peace.

Twelve hundred men under command of the General arrived at

Harrisburg from Philadelphia Dec. 8, by the Columbia Rail Road, and were detained till the 25th.[1]

Caspar Wister joined a regiment, of which his townsman and friend Dr. Thomas F. Betton was surgeon, as his assistant. It is evident that professional examination did not precede appointment in this case. Nevertheless, he received the pay of an assistant surgeon while employed.

Up to that time he was the first of his kinsmen to engage in military service, because bearing arms was repugnant to their sense of religious duty. Subsequently however several of them served with credit in the late rebellion as regimental or company officers.

This riotous disturbance at Harrisburg made by political partizans, was called the Buckshot War, because Governor Ritner had directed the volunteers to load their guns with buckshot and ball. Though many were alarmed nobody was wounded.

Dispairing of lucrative employment in his vocation at home, he imagined probably that a country where settlers were many and increasing, land sales would be common and for such reasons the services of a surveyor would be in constant demand. His attention was directed to Texas, the independence of which had been recognized by the United States in 1837.

Equipped with surveying instruments and a rifle, he sailed from New York, Oct. 28, 1839, for Texas, by way of New Orleans, where he arrived Nov. 18 and reached Galveston Nov. 20, and took the boat up the river to Houston. He proceeded immediately to the west. In a letter, dated Houston, Dec. 28, 1839, he wrote :—" You may imagine the figure I cut, mounted on a mustang poney, about half tamed, on a Mexican saddle, leggings, a queer blanket coat, and around my waist a broad leathern belt in which were placed a pair of pistols and a bowie knife, it being necessary to travel armed in this country—particularly when travelling alone, as I was, there being men here who might take advantage of an unarmed man, should his money be seen; and you are frequently meeting some prowling Indians who are friendly to Texas, but more through fear than love."

[1] See "Address of the Hon. Charles B. Penrose, Speaker of the Senate; and the Speeches of Messrs. Fraley, (City) Williams, Pearson and Penrose, delivered in the Senate of Pennsylvania, [March 1839] on the subject of the Insurrection at Harrisburg, at the meeting of the Legislature in December 1838." 8vo., pp. 207. Printed by E. Guyer, Harrisburg 1839.

Also, History of Philadelphia—1609 to 1884. By J. Thomas Scharf and Thompson Westcott. Quarto. L. H. Everts & Co., Philadelphia 1884.

This journey was to make collections for a cotton-shipper from Kentucky, and led him over "the best lands of Texas." He travelled on the prairies some two hundred miles, the huts of settlers being fifteen to twenty miles apart and the roadways very indistinct. "At night," he says, "I made my supper on corn-dodger; and, wrapping myself in saddle-blankets, with my head on my saddle bags and feet to the fire, was soon sung to sleep by the dismal music of the wolves. * * * *

"There is nothing doing here in engineering. I have turned merchant; been to New Orleans, bought some $400 worth of goods and consigned them to men here at so much per cent.; and at the same time, I am broker and speculator in a small way, so that I pay my expenses and manage to keep an eye on everything around."

His experience during 1840 was unhappy. While at Walnut Bluff on the Colorado, in May, he and his four companions were taken, about the same time, with "bilious remittent fever." In this condition they were obliged to wait four or five days for a wagon to bring them medicine from Houston. Their only food was corn bread and venison; and some days none was well enough to prepare it. On the day the wagon arrived he took ten grains of calomel; two days after fifteen grains, and the next day ten grains of tartar emetic without relief. By advice of an old settler he took forty grains of calomel, and was free from fever for two weeks. It then returned, and he "again broke it" by the same means. The fever recurred at intervals of one or two weeks, and each recurrence was met with the forty grains of calomel till July. Then he became alarmed on account of the quantity of mercury he had taken to which he ascribed the cramps with which he was afflicted, and resolved to travel till he found a doctor.

He rode two hours morning and evening and completed thirty miles before another attack. He stopped at the house of a settler and sent ten miles for a doctor, but in spite of all he could do the disease continued, with pain in the region of the liver and night sweats, till the middle of September. Then the fever became intermittent with a much swollen spleen. At last he found partial relief, with a relapse every few weeks. He had pain in his stomach, which "refused to digest."

In October while chopping a limb of a tree to be used in construction of a hut, or cabin he divided the bone of his left big toe and split the bone of the second toe, the axe cutting through the side of his boot to the sole. This accident caused him to be on his back with his foot higher than his head during four weeks.

He ends his long letter, dated Houston Dec. 28, 1840, of which the above is a summary, saying; "it has healed up. I have thrown away my crutches and walk with a stick. * * * I cannot help laughing when I look back over my misfortunes, but looking forward is another matter."

Without announcing his coming, he appeared at home, in April 1841, bringing with him a cargo of deer skins which he sold to glove makers.

During this visit he related to a friend that while travelling with a companion over the prairie they lost the track. Their provisions and ammunition were nearly exhausted. It was agreed that one should remain where they were while the other should search for a settlement. It fell to Caspar's lot to remain. After his companion had left him alone he kindled a fire, and, to promote its burning, heedlessly poured upon it from his horn a few grains of powder. The horn exploded. After the flash he was in darkness. He had been totally deprived of sight. His condition was appalling. Alone on the prairie, blind, without food. In this desperate state, unable to direct his movements, he crawled to find water which he knew was not far off. Fortunately he reached a little stream and by freely washing partially recovered his sight. His companion returned after an absence of a few days, bringing food and ammunition in time to rescue him from starvation. His sight was quite restored; and they were speedily on their way once more.

He remained at home till the autumn and then returned to Texas with a cargo of merchandize. He wrote, Dec. 9, 1841, that he "found Houston quite healthy and business good."

As soon as it was reported that Mexican forces had invaded Texas and captured San Antonio de Bexar, every one who could ride was armed and in the saddle eager to fight.

Caspar left Houston as a private in a company of mounted rifles. He wrote, April 17, 1842, just after he returned from the army, "Active service in this country combines all the hardships that can be endured. Our bed was the grass, the saddle for a pillow, without tents or covering of any kind. Rain or shine we had only saddle-blankets to wrap up in. Our food was little chips of jerked beef, heated on a ramrod till they resembled the cinders of a blacksmith's forge, and just about as nourishing. Of bread or farinaceous substance of any description we had none. This was slim diet upon which to ride thirty miles a day, stand guard, etc. It was harder work than soldiering about

Germantown on the Fourth of July. As we approached San Antonio preparations were made for battle, and I rose to the distinguished rank of Second Sergeant which exempted me from guard duty and placed me in the proud position of file leader of the first squadron of our company. But alas! for the laurels. The Mexicaus would not fight, and retreated from San Antonio at a full run. We took possession without firing a gun, and placed the Lone Star in triumph on the cross of the Cathedral.

"After travelling 250 miles, 100 of them through a country inhabited by Comanchees, without a vestige, a house or any object to give notice that the white race had ever trodden this wilderness, it was a singular feeling to find myself riding down the streets of a city, dating its birth anterior to that of Philadelphia, and built entirely of stone—its palaces and churches, its missions and cathedrals, immense in extent, grand in conception and beautiful in construction, all sinking in confused masses of earth from which they originally sprang. A few more visits from a Texas army and the hand of time will be spared the work of crumbling their monuments. * * * I left my business in good hands; and if I had been killed, you would have been written to."

In the same year he was again in the army of Texas. He did not receive the pay due for this service till 1855, a modest sum, with which he procured four silver goblets and had inscribed upon each a "lone star," the national symbol, and beneath it—"Service of the Republic of Texas. 1st Sergeant in Sherman's Mounted Dragoons. Mexican Invasion. 1842."

Thus end the records of Caspar's sojourn in Texas, which was probably extended a year after he was discharged from the army. His experience as a merchant had not been quite satisfactory. In April or May, 1843, he came home not to return.

He began to study medicine, probably in the autumn of 1843, in the office of Dr. George B. Wood, and in March, 1846, received the degree of M.D. from the medical department of the University of Pennsylvania, his thesis being on the *Origin and Progress of Medicine.*

The same year, July 20, he married Miss Lydia H. Simmons, of Philadelphia.

He was now in his twenty-eighth year. He had had rough experience among pioneers and adventurers in a comparatively new country —then an asylum for such as go to Canada now, preferably incog.— and had resumed his connection with a better mannered society. He was no longer a citizen of Texas. He had become Dr. Caspar Wister

of Philadelphia, and felt no doubt that he was bound in some vague way to uphold the dignity of the profession—to work for the welfare of others, and not exclusively to please himself and increase his fortune, as he had done in Texas. He had taken leave of that method.

Starting with an equipment suitable and sufficient to enable him to follow his vocation successfully, he soon laid the foundation of a good practice. His attractive manners and attentive ways won for him the confidence and lasting respect of his patients; and his professional associates regarded him as a pains-taking and efficient general practitioner.

In Feb., 1848, his wife died, leaving an infant daughter to his care.

He was physician of the "Indigent Widows and Single Women's Society" from May, 1847, till 1852. In the annual report for that year it is stated that "the acknowledgments of the Society are deservedly due to Dr. Caspar Wister for his honorary though laborious services as physician. It is a subject of sincere regret that he has found it necessary at last to resign the charge he has borne so faithfully."

From 1848 to 1869 he was physician of the Association for the Care of Colored Children—commonly called the shelter for colored orphans.

He was elected a member of the Board of Managers of the House of Refuge, Jan. 9, 1849, and was habitually present at their meetings during thirty-nine years, till his death. Though he was not a consulting physician of the House, he was called to important cases and cheerfully responded to all demands upon his time and skill.

He married June 26, 1854, Miss Annis Lee Furness.

From 1856 until his death he was Medical Examiner of the Philadelphia branch of the New York Mutual Life Insurance Company.

He was a member of the Academy of Natural Sciences of Philadelphia from June, 1851, and of the American Philosophical Society from January, 1859.

From June 9, 1862, to June 16, 1863, and from July 8 to Oct. 6, 1863, he served at the U. S. A. Satterlee General Hospital, Philadelphia, under contract as an acting assistant surgeon U. S. Army.

"Being a warm personal friend of General McClellan he accepted an invitation from him to join his head quarters at Yorktown. He accompanied the army on its advance from that point and its subsequent movement to the James river, being present at all the battles during that period, known as the seven day battles."[1]—June, 1862.

[1] Obituary notice of Caspar Wister, M.D. By Craig Biddle. Read before the American Philosophical Society, Oct. 4, 1889.

He was a member of the Biological Club, a dining association, composed of members of the Academy of Natural Sciences, of Philadelphia, from 1866.

He was elected a Trustee and Director of the Philadelphia Library Company in 1868.

His only child by his second wife, a promising boy fourteen years old, died Dec. 14, 1869.

From May till October of 1873, he passed in Europe; and in the same year was elected a member of the Mutual Assurance Company.

He was elected a member of the Penn Club, May 31, 1878; and about the same time President of the Social Art Club, of which he was an original member. The name of the association was changed, March, 1888, to Rittenhouse Club.

In the morning of Aug. 21, 1879, Dr. Wister accompanied his wife to the Pennsylvania Rail Road depot in West Philadelphia. Just after they had alighted from a street car opposite to it, an impatient horse, ridden by an incapable boy struck his back and dashed him headlong against one of the iron columns which support the roof of the approach to the depôt. Although his frontal bone was badly fractured, near the left temporal ridge, and his lower limbs were rigidly extended, his consciousness was not impaired. He gave detailed instructions for his conveyance home, and directed a messenger where to find Dr. D. Hayes Agnew, who had engaged to meet him at that hour in consultation.

Drs. Agnew and Walter F. Atlee conducted his case. A trephine was applied in two places, the depressed bone raised, and more than twenty fragments removed. His intelligence was clear throughout his illness. He recovered without any mental detriment, and, except a stiff neck, no permanent evil seemed to follow the injury.

Some of his friends, however, entertained a notion that the effects of this injury in some manner shortened his life, though nothing in his subsequent career can be cited in support of the conjecture.

Physically he was a typical man, and up to the date of the accident his health had been generally vigorous. To break thin ice in the Schuylkill for a bath; to walk ten miles to dine with a friend in the country and walk home after dinner; to swim along side of a yacht underway, with a line fast to a wrist, were to him delightful.

His interest in athletic sports led him, in 1860, to take an active part in forming the Philadelphia Sparring and Fencing Club. He was one of its incorporators in 1873, and its president from 1867. It has

been notably prosperous under his administration. The roll of its members now includes the names of five hundred gentlemen, all of unquestionable standing.

He was elected a Director of the Philadelphia Saving Fund, and president of the Inspectors of the County Prison in 1880. Infirm health induced him to resign the office in Sept., 1888.

In 1886, he assisted to reëstablish the Wistar Association which had ceased to be active since the winter of 1863–64, because during that season guests sometimes disturbed the social harmony of the Wistar parties by over-earnest discussions of political questions connected with the rebellion. Not long afterwards the Saturday Club, of which Dr. Wister was a member, superseded the Wistar Association and continued active for several years.

Only a fourth of the score of corporations with which he was associated was medical. The purposes of the rest were different, perhaps discordant—scientific, social, financial—and in no sense congenial in their methods or proceedings; and yet he found pleasure in contributing to the progress of each. Habitually prompt to decide, firm of purpose and punctual to his appointments, he acceptably discharged whatever duties fell to him in every instance.

In the course of his career, his experience of men and things had been varied and wide; and perhaps therefore, he was able to adapt himself admirably to any situation in which he happened to be placed. His friend, the Hon. Craig Biddle, most truly said of him that "although no man was less bashful, few men were so modest."[1] And possibly the quality here implied may have prevented him from ever drifting into narration of reminiscences of himself under any circumstances.

His genial, manly, open and pleasing address constituted in him a kind of magnetic force which powerfully attracted and influenced strangers at their first accost; and they, quickly perceiving his good sense, at once gave him their confidence, but without getting his in return, for his faith in men was notably restricted.

His spirit of humor enlivened his conversation, and his literary compositions which were too few and seldom printed. As specimens of his work in this line the following are presented.

Early in 1877—two years before his injury—neighbors of St. Mark's Church in Locust street, complained that the chiming of the bells, then

[1] Obituary notice of Caspar Wister, M.D.

recently hung up in its steeple, was a nuisance and brought suit in Court to have it abated. Dr. Wister described the situation in the following lines for the amusement of his friends.

"Concordia, we the bell shall call."
—SCHILLER.

*Tune.*—The Bells of Shandon.

With deep vexation and execration
I wake at six to those St. Mark's bells,
That, with clash and jingle, make my nerves tingle,
While the doctor's visit my pulse foretells,
As I lie quaking and the house is shaking,
With the noise they're making—
I dread to meet
The storm that's brewing,
To their undoing,
In the troubled bedding of Locust Street.

From Christ Church steeple, o'er the humble people
Who dwell around it, the sweet chimes ring,
And add a savour to the rest from labour,
That the peaceful Sabbath is sure to bring.
But here's no liking to the din and smiting
That makes indicting
A purpose meet,
For the roar and rumble,
The growl and grumble
That make a Bedlam of Locust Street.

There's a bell whose swinging gives out no ringing,
And I hear no dinging in the State House yard;
And where its rolling looks like tolling
I stand and tremble lest my hearing's hard;
For, with steeple rocking and hammer knocking,
And the people mocking,
I hear no more
The low dull mutter
Those dumb lips utter
Than the Stone Washington before the door.

I've seen belles charming for vict'ry arming
With beauty conquer, with wit compel,
And read the story, in legends hoary,
How friends fled shrieking from the passing bell;
But the bell that's staying and keeps on swaying
Is but delaying
The time we'll greet,
When saint and beauty
Shall unite, in duty
To drive the devil out of Locust Street.

Two years after fracturing his skull, Dr. Wister, the guest of his friend Mr. H. C. Lea on board of the yacht, Vega, visited the West Indies, and some months after returning home, published in Lippincott's Magazine for 1883;—"A Cruise among the Windward Islands—The Log of the Vega." The article is a fair sample of his literary ability. A few extracts from it are presented to show his style and the character of his humor in prose.

The Vega arrived at Barbadoes on the first day of the week. In this connection it is recorded in the Log that,

"Sunday was a day always sanctified to us by the absence of cards and the presence of plum-duff, a day devoted to in—and intro—spection—inspection of habiliments often ending in looking up the diddy-bag, while introspection gradually slid into sleep."

* * * * * *

"The mango is a very favorite fruit, about the size and color of a fine yellow plum. The pulp is very light yellow and tastes like a mild turpentine stupe. The skin is leather and its contents are fibres and bristles. There is no amount of personal intimacy that would warrant any two persons of either sex in sitting down together to eat mangoes, for the rending of the fibres, the dripping of juice, and the drawing out of bristles, unite to produce so unseemly and unclean an exhibition that this fruit should be indulged in only in the privacy of one's own bath room and in a sitz bath to the chin."

* * * * * *

"With Antigua to windward we passed Redonda, a peak of rock rising sheer six hundred feet out of the water; one side of it is perfectly smooth and straight, and seems made for American embellishments, such as 'Use Purifying Pills,' or 'Two thousand miles to Wanamaker's.'"

"Mount Nevis enjoys a local celebrity for its sheep, and the steward went on shore and procured some diaphanous mutton—a sheep that cast no shadow, not because the sun was directly over its head, but from lack of substance—a sheep which if left to live might in time have developed progressively into a burning glass. When we got him, all chance of animal development was long past. We found that his flesh when cooked broke with a vitreous fracture."

* * * * * *

"At six P M. we passed Saba, its coast iron-bound, and without landings except in favorable states of the weather. The island is an irregular plateau two thousand eight hundred feet above the sea, diversified by precipitous rocks, sharp acclivities and ravines. Through one of these, called the Ladder, the town is reached, around which is found the only cultivation—that of potatoes, which are sold among the other islands. The population, amounting to one thousand eight hundred, is mainly devoted to the raising of chickens. From the sea the town, with its white houses and red roofs, looked exceedingly neat and pretty. The island belongs to Holland; its language is English. The people, almost all either Simmons or Hazel by name, largely send their children to Paris to be educated. They are famous for building a class of small vessels, although they have no port. The town, nine hundred and sixty feet above the sea, is named the Bottom,—which is quite in keeping with the other anomalies of Saba."

June 21, 1882, Delaware Breakwater. "And here we took the trade wind once more,—that of the region, which blows unceasingly through the funnels of the tugs."

The name of Dr. Caspar Wister was placed on the roll of the fellows of the College of Physicians of Philadelphia, January 1848.

Between the years 1852 and 1874 he was frequently elected a delegate from the College to the American Medical Association. At the meeting of that body, in 1855, he was appointed its Treasurer and a member of its Publication Committee. On retiring from these positions, in 1877, his services were noticed as follows;—

"At the twenty-eighth annual meeting of the American Medical Association, at Chicago, June 8, 1877, on motion of Dr. P. F. Hibberd of Indiana;—*Resolved*, That this Association, in view of the retirement of the gentleman who, for twenty-two years, has discharged the responsible and laborious duties of that situation, desires in this manner to express its high appreciation of, and full satisfaction with the promptness and completeness with which Caspar Wister has discharged the

incumbent obligations of its financial agent, for so many years, and hereby tenders to him the sincerest thanks of the Association for such long and honorable service."

Being a delegate from the College to that body, he was appointed Treasurer of the International Medical Congress, which met in Philadelphia in 1876. After settling the affairs of the office, Dr. Wister transferred to the College, Feb. 4, 1880, $800, the balance of the fund of the Congress in his custody, to establish the International Medical Congress Trust Fund, the income thereof to be applied to illustrate the Transactions of the College.

In 1860, Dr. Wister contributed to the first building fund of the college; and from Dec. 1882 was an efficient member of its Committee on Finance.

Many months prior to the close of his life his good health began to fail; digestion was impaired, and his appearance and movements signified to a close observer that he was in some degree an invalid. Then, he had frequent attacks of intense gastric suffering which were controllable only by the hypodermic use of morphia. Organic disease and malignant disease were sometimes suspected, notwithstanding that small tophi, which had long been observable on the terminal phalanges of his fingers, suggested gout. Many weeks in anticipation of the end, he directed that a post mortem of himself should settle his doubt, remarking at the time, in a spirit of grim humor, that he would like to be present, for he was sure it would be interesting.

Convinced for a long time that his recovery was hopeless he serenely awaited the coming end, and, as sane men always do, acquiesced in the inevitable.

He peacefully died at four o'clock, A. M., Dec. 20, 1888.

His funeral was after the manner of the Society of Friends. He approved of their doctrine generally, and irregularly was present at their Sabbath meetings.

He bequeathed his moderately ample estate to his wife and daughter.

Several of the Societies with which Dr. Wister was associated expressed the sense of their loss in formal resolutions. Extracts from them will be sufficient testimony of their appreciation of his worth and services.

December 21, 1888, "*Resolved*, That the officers and members of the Philadelphia Fencing and Sparring Club desire to inscribe on their minutes an expression of the lasting obligations which Dr. Caspar Wister has conferred upon them by the zeal and sagacity with which

he has directed their Organization, and which, in a material way no less than in the sentiments of respect and affection which he has everywhere inspired, have made this Organization itself a monument to his honored memory."

A portrait of Dr. Wister in oil has been hung in their club-house.

The following is from the Minutes made by the Board of Managers of the House of Refuge, December 27, 1888.

"Elected to this Board in 1849, for many years and until the severe accident which curtailed his usefulness, and indirectly was the cause of his death, he was always found most faithful and energetic in promoting the best interests of the House of Refuge, as well as of the County Prison, and with kindred institutions where his excellent executive abilities, wise counsel and eloquent and incisive address were always highly appreciated by his colleagues.

"His kindly and courteous and general manner greatly endeared him to his associates who will long hold in affectionate remembrance his many good qualities of head and heart."

The Library Company of Philadelphia, January 5, 1889, *Resolved*, "That in him we have lost one of our most valued associates, whose rigid conception of duty led him to discharge ably and conscientiously all the responsibilities of life, and whose rare natural gifts and varied culture invested with a peculiar charm his personal intercourse with all who were privileged to reckon themselves among his friends."

The Rittenhouse Club recorded a "minute to the memory of the late president," Jan. 7, 1889. The following is an extract from it.

"Dr. Wister who was of the finest type of manly vigor, met unfortunately with an accident which sapped his vitality and eventually caused his death.

"The untold sufferings which he has endured for the last few years were known only to his family. The heroic firmness with which he faced his inevitable fate, the cheerful alacrity with which he performed all his duties and the unruffled exterior which concealed the tortures which he suffered, made it almost impossible to believe that his life hung by a thread and that he was fully conscious of it.

"He felt, if ever man felt, that it was not necessary that he should live, but it was necessary that he should perform to the last hour of his life every duty that he had undertaken. No soldier ever died at his post with calmer courage or serener port than he of whom we are now speaking.

"He possessed, as we all know, the most genial nature To the

young and the old, to the man of business and to the man of leisure, at the hospital and in the prison, his presence was as welcome as at the play-ground, where he mingled with the most youthful of his friends.

"His popularity arose not from any easiness of disposition, but from the profound regard for his manly character. Open, frank, decided and truthful, his convictions, from their sincerity, impressed themselves upon everyone whom he met, and, though you might not agree with them, it was impossible not to respect them. With the sternest sense of honor he had the gentleness of a woman toward those whose weaker nature had been the cause of their deviation from the path of rectitude. While he could not understand it, he would always pity it."

The Rittenhouse Club had painted several years ago, by a skilful artist, an admirable portrait of Dr. Wister.

The following is taken from another tribute to his memory. It was resolved, Jan. 10, 1889, that;—

"The Directors of the Mutual Assurance Company desire to express their grief at the death of their associate Dr. Caspar Wister, for fifteen years a member of this Board. His directness of character, his steadfast honor and his careful attention to every duty made him an admirable representative and guardian of the large interests committed to our care.

"His cultivation and knowledge of men and books gave to his companionship a charm of rare quality, made more delightful by a certain flavor in his manner of the courtesy and quiet of another day, as a just, honorable and careful man, we shall miss him from our business, and as a refined gentleman his loss will be long felt in hours of social intercourse."

The following paragraphs are taken from a memorial unanimously adopted Jan. 11, 1889, by The Philadelphia Saving Fund Society.

"Few men of his time have held so high a place in the esteem and affection of the gentlemen of Philadelphia as our late associate Dr. Caspar Wister, whose death, on the 20th of December, 1888, we now sorrowfully record.

"Born on the 15th of September, 1818, at the ancestral home in Germantown, Dr. Wister was trained, educated and developed in the best social atmosphere of his country, and his life and character illustrated the truth of his favorite maxim—'Noblesse oblige.'

* * * * * *

"His appointment to this Board in December, 1882, was hailed with pleasure by all its members and was recognized by Philadelphians as an addition to its strength.

"His duties here were wisely, faithfully and zealously performed; sometimes of late at the cost of no little suffering; for during the last two years, the subtle disease which terminated his useful and honored life made prolonged exertion very painful to him."

The preceding sketch of the life of the late Dr. Caspar Wister, has been written not to eulogize him, but with a desire to present truly the prominent features of his character, so that it may be seen how it grew better and better and stronger from boyhood to maturity, and why he was beloved by his contemporaries.

He was not a leader of thought in any direction, an investigator in any field of science, nor in any high office or capacity a ruler of men, nor a contributor to medical literature in any form. Nevertheless, he faithfully and acceptably discharged all professional and other duties assigned to him in this community. His manly ways and cheering deportment secured to him in a rare degree the confidence of all, and made him a favorite among gentlemen widely acquainted with men and affairs. He was popular. His warmly-attached friends were numerous. It may be said without disparagement to any, that of the many Fellows who have been more eminent and justly distinguished in professional achievement and learning, none has obtained in a higher degree the personal affection and respect of this brotherhood of physicians.

# COLLEGE OF PHYSICIANS OF PHILADELPHIA.

DECEMBER 3, 1890.

S. WEIR MITCHELL, M.D., THE VICE-PRESIDENT, IN THE CHAIR.

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## REMARKS COMMEMORATIVE OF SAMUEL LEWIS, M.D.

DR. S. WEIR MITCHELL.

The President's Address has announced to you the death of Samuel Lewis, an ex-President of the College.

It is impossible that I should personally pass by this occasion without a word of comment.

No other Fellow has been so valuable and so long or so steadily useful as Samuel Lewis. First, there was the gift of his great library; then his incessant care of it, and for many years a steady and intelligent generosity out of all proportion to the size of an income never more than very moderate. Despite the gradual failure of his bodily faculties, he continued to show ever the same interest; nor was his a mere scholarly liking for rare books. He longed to fill the gaps in journals, and disliked to see a man who needed a book unable to find it here. Beyond this, too, he had a refined affection for rare and old books. His last gift was a valuable edition of Fludd's works, a most curious and interesting addition to our treasures. This book lies on the table to-night, and will bear within it a record to the effect that it was his last gift to us. Alas! With his death this noble and sagacious bounty ceases.

He said to me, of late, as he stood in his library, "Very soon I shall be gone, and who will take care of my books and do what I have been doing?" He spoke of them as one speaks of children.

I am moved here to ask you if with this good man's death his work is to stop; or, if among those of us who have means, a way shall not be found to continue his labor and gifts?

When I turn for a moment to speak of Samuel Lewis in his personal relations, I become at once conscious of the depth of my affection for him, and know that with his death certain unreplaceable values are gone out of life. I inherited from my father the friendship of our dead ex-President, and an admiration of his gentle manners and refined scholarship, which has gathered strength as the years went by, and as I learned by constant opportunities how thoughtful and true a friend was this quiet lover of books.

Dr. Arthur V. Meigs.

As for some years past I had the honor of being Dr. Lewis's physician, it is perhaps not unfitting that I should inform the Fellows of the College in regard to the circumstances of his last illness and death. Dr. Lewis was endowed by nature with a strong constitution and excellent health. He has often told me that with the exception of an attack of smallpox many years ago, he was never ill in his life. For several years past, however, age had been bearing upon him with a heavy hand, and for two or three years I have known that he had a lesion of the aortic valve of the heart which caused both obstruction and regurgitation, while latterly he was subject to attacks of partial syncope. Besides all this, there were other ailments commonly incident to advancing age. During the past summer I visited him more than once at his residence at Bryn Mawr, and, although he continued as ever interested in his books and flowers, for he loved the cultivation of flowers, he never failed to say that his strength was fast leaving him, that it had become a labor even to walk the short distance to his garden, and that his end must be near. When I remonstrated and said what I could that was cheering, he would shake his head, and, with a kindly smile and as little of melancholy as it is possible for a human being to have in speaking of his own end, say that it could not be far distant. November 8th he sent for me, and when I left him it was with the understanding that if the remedies I recommended did not afford any relief, I should visit him again. Soon after this he was once more at the College looking over his books. The following day, however, Saturday, November 15, he was seized in the evening with

great difficulty of breathing, which during the night became so alarming that Dr. George S. Gerhard, of Ardmore, was sent for. The effects of this seizure never left him, though he improved after it and for a day or two it seemed as if he might recover, yet he was never again able to lie down with comfort, and the congestion of the lungs, which at first was slight, increased, and he died November 26, 1890, aged seventy-seven years and a few days.

As it has fallen to my lot to speak of my dear friend, I cannot close without adding something of the impression which his character made upon me. He was, I think, the most kindly and gentle philosopher it has ever been my good fortune to know. Fear of death he had none, but looked forward with absolute composure to his leaving the world, though he thoroughly enjoyed life even to its end. In his judgment of men I always found him kindly and charitable, disposed to overlook faults and see the better side of character. Though he was born in the West Indies and received his medical education at the University of Edinburgh, he was heart and soul a member of the medical profession of Philadelphia, never tiring of sounding its praises and always ready to defend its fame. His loyalty, too, and pride in the medical profession of the city of his adoption seemed to have become a part of his nature. For the College of Physicians of Philadelphia he had an admiration and love which only died when he himself ceased to live. Our Institution was constantly in his thoughts, and its name ever on his tongue; for it he did his best life's-work. It is only necessary for us to look around our halls at the books to realize how much he did for us. His example was perhaps more precious to us even than his gifts, and he never tired of saying how elevating was the influence brought to bear upon us all who have been fortunate enough to attain to Fellowship in this College, and how jealously we should guard our right to keep out anyone who might prove unworthy. Our College of Physicians has lost one of its best friends and most generous benefactors, and the medical profession of Philadelphia has lost one of its most loyal members, one who was always ready to uphold its fair fame and great distinction.

Dr. John Ashhurst, Jr.

Mr. President and Fellows of the College: A very few weeks before the death of Dr. Lewis, he called me to one side in his favorite room—the Lewis library—and said to me that as soon as he

came to town—he was at that time living in the country—he wanted to have a long talk with me about what he wished done after his death. He said that he had not time to tell me all then, but that he would mention one or two matters, and when he returned to town he would have a long talk and tell me much more. One thing that he did say was that when he died, which was an event which he felt might occur at any moment, he wanted no memoir to be written. In view of this request, we may almost say his dying request, we have felt that no course was open to us but to obey his wishes, although I am sure that everyone will agree with me that no Fellow of the College could be more worthy of a memoir, and of such laudation as properly finds its place in such a record. Under the circumstances, however, our hands are tied, and it has therefore seemed suitable to your presiding officer that I, as one of Dr. Lewis's oldest friends in the College, and perhaps more closely associated with him during the last twenty-five years than any other, should on this occasion, in an informal way, and without any attempt to furnish a biographical sketch of our friend, recall a few reminiscences of his early history as I have heard it from his own lips, and a few recollections of my own, which may serve to illustrate his character and life, particularly in its relations to our College.

It is an interesting coincidence that the day of the beginning of Dr. Lewis's last illness, the 16th of last month, was his birthday. He was born in Barbados, W. I., on November 16, 1813, and his last illness began on November 16, 1890, when he had just reached the age of seventy-seven years. Dr. Lewis came to Philadelphia with the family of his relative and guardian, Rev. William Prescod Hinds, in the spring of 1834, when not quite twenty-one years old. He had probably even before he came to America determined to make the study of medicine the work of his life, and in the fall of 1834 he matriculated at the University of Pennsylvania, a fact which I think is not generally known to the Fellows, and was an attendant upon the lectures at that Institution during the session of 1834–35. He often spoke to me of his recollections of the professors at that time, and of the very serious dissensions which arose during that year in the University, and which terminated in the resignation of Dr. John Redman Coxe, the then professor of materia medica and pharmacy. Dr. Lewis was an interested spectator of those events, though I think he took no active part in them. Whether on account of the internal dissensions in the University, or for other reasons, Dr. Lewis did not pursue his studies in our city more than one year, and in August, 1835, went to Europe,

sailing in one of the packet ships belonging to the Cope line, and commanded by Captain James West, who will be remembered by many as having been the commander of the steamer "Atlantic" some years subsequently. He was a well-known man in this city, a man of great worth, and of striking appearance. It is an interesting circumstance that this early voyage was made with Captain West, and that many years afterward Dr. Lewis became closely associated with his brother, Dr. Francis West, a valued Fellow of this College. On arriving in Europe, Dr. Lewis at once matriculated at the University of Edinburgh and very soon afterward was attacked by an illness from which he narrowly escaped with his life.

In the island of Barbados, I have often heard Dr. Lewis say, smallpox was unknown, and vaccination unheard of. Dr. Lewis had therefore never been vaccinated, and as a consequence, when he went to Edinburgh, was unprotected. Almost immediately after beginning his studies in practical anatomy, he had assigned to him for dissection the corpse of a man who had died of smallpox, and from this dead body he contracted the disease in its unmodified form, and was extremely ill, with difficulty escaping with his life, and his face bearing the marks of pitting until his dying day. After recovering from this illness he continued his studies, and ultimately became a house surgeon or "dresser" to Mr. James Syme, then Professor of Clinical Surgery in the University of Edinburgh, the chair afterward held by Sir Joseph Lister. I have often heard Dr. Lewis speak of the great operative skill of Mr. Syme, which is also a matter of history, and particularly of his dexterity in manipulations connected with diseases of the urinary organs. It is probably known to the Fellows of the College that it was long a boast of Mr. Syme, that he had never failed in passing a catheter, even though the tightest stricture, and that he maintained that whenever the urine could find its way out, a skilful operator could get an instrument in. One instance of Mr. Syme's skill may be of interest in this connection. Dr. Lewis told me that on one occasion a patient was brought into the Royal Infirmary suffering with retention of urine, the result of a very tight stricture. The case was not under Mr. Syme's care, but under that of another surgeon, who attempted to pass an instrument, but failed, and then expressed the opinion that the operation of perineal section would be necessary. A consultation of all the surgeons was called, and each one in succession tried to pass the instrument, but without success. There was some jealousy on the part of the others toward Mr. Syme, and he was not invited to try the

catheter until everyone else had failed. He was then handed the instrument, as a matter of form, and at once passed it without difficulty, thus relieving the patient. Dr. Lewis, in telling of this, added, using an expression which seems to have been common among the young men connected with the hospital, that Mr. Syme's assistants "wiped the eyes of the other fellows well" on that occasion.

It may be a matter of interest to mention, what is familiar to many of the Fellows who have been Resident Physicians at the Pennsylvania Hospital, that the set of silver catheters long in use in that Institution were made for it after models brought over by Dr. Lewis, whose own case of instruments, made by Mr. Syme's instrument-maker and after which those in the Pennsylvania Hospital were copied, is now in my possession, Dr. Lewis having given it to me in 1872 on his departure for Europe. I also have the pocket-case and the stethoscope which Dr. Lewis used while engaged in practice in this city.

Dr. Lewis did not spend all of his time in Edinburgh, but a portion in London, where he was admitted a member of the Royal College of Surgeons in 1839. He also spent some time in Dublin, attending the lectures of a distinguished botanical teacher there, whose name I do not know. Returning to Scotland, he took his degree of Doctor of Medicine in 1840, and in the same year became a member of the Royal Medical Society and of the Royal Physical Society of the University of Edinburgh.

Dr. Lewis returned to America in 1840, and engaged in practice somewhat actively for a short time. He had principally office practice, but he gradually gave up even this, for his health, while he never had a serious illness with the exception of the attack of small-pox, was not so robust as to make him feel equal to the fatigues of a laborious *clientèle*, and as it was not necessary for him pecuniarily, he allowed his interest in matters pertaining to books and the scientific side of his profession to take the time which he had at first given to its practical part. He reported a few cases in the *Medical Examiner*, an excellent journal then published in this city, and wrote some reviews of books for the same journal, and occasionally for the *American Journal of the Medical Sciences*. For a time he assisted Dr. Samuel Hollingsworth, the editor of the *Medical Examiner*, in his editorial work. Dr. Lewis's most intimate friends at this time were Dr. Hollingsworth, Dr. John Neill, Dr. Francis Gurney Smith, Dr. Caspar Wister, and Dr. Stillé, the only survivor of the medical men

of that day who were especially associated with our friend in his early professional career.

Dr. Lewis was elected a Fellow of this College in February, 1849, and, therefore, at the time of his death, had been a Fellow for nearly forty-two years. About 1855, he took a great deal of interest in the establishment of the Children's Hospital, which was founded at that time under the fostering care of Drs. Francis W. Lewis and T. Hewson Bache. In this hospital Dr. Lewis was much interested, becoming himself a liberal contributor, and aiding in securing large contributions from others. He became a member of the American Medical Association in 1851, and of the Academy of Natural Sciences in 1855, continuing his connection with this Society until the time of his death. He was an original member of the Philadelphia Pathological Society, and was for a time a member of the Philadelphia County Medical Society, and one of its Censors. Dr. Lewis became a member of the Library Committee of this College in 1854, and served continuously, with two intervals, one of five years and one of three, until the time of his death, serving therefore, in all, nearly twenty-eight years as a member of this Committee. He was also a member of the Publication Committee from 1864 to 1872, serving on that Committee faithfully for eight years. He was a Censor from 1880 to 1884, when he was elected to the office of President, and shortly after retiring from that position was again elected Censor, continuing as such until he died. He was President of the College from January to May, 1884, and then resigned on account of physical infirmity interfering with the discharge of his duties in that office to his own satisfaction, although no one else felt that there was any lack of either interest or activity in the manner in which he filled the Presidential chair. Dr. Lewis's associates in the Library Committee for many years were Dr. Francis West, Dr. Lajus, Dr. Thomas F. Betton, Dr. Bridges, Dr. Walter F. Atlee, Dr. Stillé, and myself.

On February 27, 1864, Dr. Lewis presented his private library to the College, and his books, which numbered over 2500 volumes, were immediately placed in cases provided for the purpose. The collection, which the College ordered should be forever known as the "Lewis Library," at first occupied the small room to the right of the staircase, but afterward, when it became too large for these quarters, was moved to the room on the left side which it now occupies, and which had previously been the meeting-room of the College. In the summer of 1867 the health of Dr. Lewis was not as good as it had been, and he

was induced to accompany one of the United States exploring expeditions under Dr. F. V. Hayden to the extreme western part of our country. Dr. John L. Le Conte went as scientific observer, while Dr. Lewis went as surgeon. He enjoyed the trip very much, seeing a little of Indian warfare at a distance, and returning in the autumn much invigorated. In the spring of 1872 Dr. Lewis went to Europe with the family of Mr. Thomas, a relative, and the son-in-law of his guardian, Rev. Mr. Hinds, remaining abroad over five years, and spending part of the time in Great Britain and part on the Continent. This episode in his life Dr. Lewis, as I know from his letters, enjoyed very much, and was glad to renew his acquaintance with Sir William Fergusson and other medical celebrities who had been comparatively young men during the time of his student-days.

As a book-collector, Dr. Lewis was more generally known than in any other aspect of his life. He was certainly a great collector of books, and it is an interesting fact that even in selecting his private library, it seems to have been with the design of giving it to the College, since he avoided duplicating such books as the College already possessed. Thus, when his 2500 volumes were presented, our library became at once one of the most valuable in the city. Although not as large in numbers as that of the Pennsylvania Hospital, in many respects it was more valuable, because more fully representing the medical literature of all ages.

My personal acquaintance with Dr. Lewis began in connection with his fondness for books and his habits as a book-collector, but our first meeting did not occur in the College, although we were both Fellows at the time. I may perhaps be excused for introducing this personal reminiscence, because it has some bearing upon his character as a book-collector. Those of the Fellows who were in the habit of importing books from Europe twenty-five years ago, will remember the well-known house of John Penington and Son, and will also remember that the invoices of books received were eagerly scrutinized by each customer to see what he had obtained of the books sent for. We ordered from second-hand catalogues, and usually obtained about one-half of the books desired. As the names of those ordering the books were marked by Mr. Penington in the margin of the invoice, we could also see what others had succeeded in obtaining, and in this way Dr. Lewis found that I had became the fortunate possessor of two volumes bound by the famous but somewhat eccentric bookbinder, Roger Payne. He sent me a message through Mr. Penington that he would

like to see these volumes, and said that if I would bring them to the shop, he would bring a book of his, also bound by the same hand, so that we could compare them. Our mutual interest in this little matter laid the foundation of a friendship which continued, deepening and widening until Dr. Lewis's death. Our first meeting occurred in 1865, and from that time there never arose between us the slightest—I cannot say difference of opinion—but not the slightest difficulty nor the slightest unkind feeling in any way on the part of either. Our friendship was, I believe, as perfect as is given to men to enjoy.

I have spoken of Dr. Lewis's interest in books and in bookbinding, because I want to correct an impression that has sometimes prevailed that he was a collector of books merely as a collector. Dr. Lewis valued books for their historical associations and for their real utility a great deal more than for mere beauty or rarity. He could appreciate a beautiful book, but he did not value it on that account alone. Thus he would care more for an Aldus or a Plantin than for a Bodoni, and in the matter of bindings would prefer a Roger Payne to a Charles Lewis or a Bauzonnet. He was a lover of books, a bibliophile in the truest sense of the word, but in no sense was he a bibliomaniac. He did not care for a book because it had an additional third of a line in height, nor did he value it more because it had rough, uncut edges, than if its edges were neatly trimmed and gilded. The greatest happiness of Dr. Lewis's life was in increasing the collection of books that he had placed in this College. He began with the large number of more than twenty-five hundred volumes, and this number has gradually swollen until it now exceeds ten thousand. I remember well his anxiety as this figure was approached, his fear that he might die before it was attained, and the satisfaction that he experienced when it had been passed. While Dr. Lewis usually presented his books by twenties or thirties, he occasionally added very large numbers at one time. Thus on the occasion of the breaking up of Dr. La Roche's library, when his books had been put up at auction, and after one or two days' sale were found to be bringing very poor prices, Dr. Lewis made an offer to take the entire remainder at the uniform rate of seventy-five cents a volume. This offer was accepted, and a large number of volumes were thus added to the library. Dr. Lewis had already many books on yellow fever, and the addition of those of Dr. La Roche made this one of the best collections on yellow fever in the world. Another set of books of which Dr. Lewis was proud, was his unequalled collection of editions of the "School of Salerno." Between

1872 and 1877, while in Europe, Dr. Lewis purchased a large number of works on the eye. He sent me a catalogue, and asked me to submit it to Dr. William F. Norris, requesting him to suggest what would be desirable for the library. Dr. Norris marked the books that he thought suitable, and Dr. Lewis purchased the entire number.

As has already been said by Dr. Mitchell, Dr. Lewis hated that anyone should need a book and not find it in his library. While he was in Europe, I mentioned to him in one of my letters that I had wished to consult Barbette's work, but had been unable to do so. With the next shipment of books from Dr. Lewis there came no less than three editions of that author. I could mention many similar instances in my own experience and in that of others where, when the want was mentioned, the book was provided as soon as possible.

Dr. Lewis had other tastes as well as his love of books. He had an excellent knowledge of chess, and was one of the five selected to contend in public against Paul Morphy, when that famous chess-player engaged in five separate games played simultaneously with five different antagonists. He was also an enthusiastic horticulturist and a great lover of flowers, and at his last visit to the city, the Friday before he was taken ill, he spent some time at the exhibition of the Horticultural Society, where there was a large display of chrysanthemums.

Dr. Lewis was a true and loyal friend in every respect, and when he had once accepted anyone as a friend, he was unwilling to see any fault in him if he could possibly avoid it. On the other hand, it is right to say that while the remark of Dr. Meigs, that he looked for the good traits of men rather than for their faults, is perfectly just, yet if he was once forced to believe that a man was dishonorable, it was very hard to get him to see anything good in that man afterward. This was simply the complementary trait to that which I have mentioned, his perfect loyalty to his friends, whom he never deserted. At the same time he never treated any man with discourtesy, and, no matter how badly he thought of him, he did not unnecessarily express an unfavorable opinion of anyone.

He had himself a very high sense of honor. He was not a man of compromises, and would never yield what he considered a matter of principle. It was from this feeling that he resigned from the Philadelphia County Medical Society. The event which occasioned his resignation is so long past that I may perhaps recall it briefly without giving offence. A member of that Society had been guilty of unprofessional conduct toward another practitioner, and the matter was re-

ferred to the Censors, of whom Dr. Lewis was one, who agreed upon a report that the offending member should be censured. When the report was presented to the Society another of the Censors opposed it, and it was rejected by a majority of the members present. Under these circumstances, Dr. Lewis felt that there was no course left for him but to resign, and his resignation was followed by that of many other influential members, inflicting upon the Society a blow from which it did not for many years fully recover.

On three occasions Dr. Lewis resigned from the Library Committee of the College. The first occasion was when he went to Europe for five years, and he was reëlected on his return. The second resignation, prompted by what he considered an injustice to a friend, was not accepted by the College, which requested him to withdraw it, and at my personal solicitation he did so, and continued to serve. About two years afterward, however, he again resigned, through a mistaken—and I have no hesitation in saying that it was a mistaken—belief that he had been treated discourteously by another member of the Committee. On this occasion also I urged him with all the force that I could, not to resign, but to continue in the Committee, and in this request our late Vice-President, Dr. Hutchinson, joined with me. But while Dr. Lewis as a gentleman accepted the explanation which was given him, and while as a Christian he forgave the person who had offended him, yet he felt that he could not go back to the Committee, since he had been so unhappy as well as so physically distressed by the occurrence; that he could not submit himself to the possibility of such an incident happening again. In speaking of it he referred to the death of John Hunter, who, as is well known, died suddenly from heart-disease after attending a meeting in which he had been subjected to great excitement, and said that he had felt so badly—so entirely thrown off his balance—that if such a thing should occur again, he feared that the result to himself might be fatal. About three years subsequently he was re elected to the Committee, the circumstances having changed, and he thenceforward served until the time of his death.

Dr. Lewis was in the habit of exchanging Christmas and New Year's cards with many of his friends, and it was a pleasant reminder to receive these tokens of affection from such a valued friend as he was. When he had occasion to consult members of the profession in regard to his own health, while he, of course, did not offer any pecuniary compensation, he always acknowledged the favor by the presentation of some object of art or something of interest which was of much

greater value than would have been the ordinary fee for the service rendered. He was liberal and generous in his dealings with his professional brethren both in the College and out of it, and not only in the way I have mentioned, but, as I happen to know, on occasions he relieved pecuniarily members of the profession who were in want, doing it in the most delicate and secret manner, not letting his right hand know what his left had done.

What I have said would not be complete if I did not add that Dr. Lewis was a sincere and faithful Christian, an humble follower of our Lord and Saviour, Jesus Christ. More than this, he was a Bible-reader. Not long before his death, Dr. Lewis told me—and his example is one that some of us may take to heart—that every year he read through almost the entire Bible, reading systematically the different portions of the Old and New Testament. He showed his faith by his works. He was not demonstrative in his professions, but those who knew him intimately knew that he was a faithful, humble Christian. He has gone from us, and surely to no man can be more fittingly applied the solemn words in the prayer for the visitation of the sick, of the Episcopal service—that having served his Maker in his generation, he is now gathered unto his fathers, having the testimony of a good conscience; in the communion of the Catholic Church; in the confidence of a certain faith; in the comfort of a reasonable, religious, and holy hope; in favor with God and in perfect charity with the world.

Dr. Alfred Stillé.

Agreeably to a request, I have prepared, and will read, a minute in reference to the death of Dr. Lewis. It is, however, a very faint reflection of the impressive remarks that have already been made. It will not be for the lack of a desire to do his memory honor, if I have failed to portray the rare virtues of our late Fellow.

### Minute Offered by Dr. Stillé, December 3, 1890.

The College of Physicians has received the announcement of the death of Dr. Samuel Lewis with profound regret, that one who so long adorned the College by his character and enriched it by his munificence should have departed from among its Fellows forever.

Since he became one of them, forty-one years ago, his interest in the

College never flagged; and, splendid as was his generosity toward it, the influence of his example has been no less beautiful and salutary.

A man of large intelligence, sound learning and refined taste, he held decided opinions upon every subject he had studied, and yet was so modest, so gentle, so free from self-assertion, that he never fell into conflict with those from whom he differed, never withdrew from a friendship he had proved, and never abandoned a belief that he had deliberated entertained.

From his entrance into the College his relations to it were marked by affection as well as loyalty, and by a generosity whose most conspicuous memorial will transmit his name and fame to future generations.

His munificent gift to it in 1864 of twenty-five hundred volumes has since then been quadrupled, and it now excels nearly all similar collections by the intrinsic value of the works composing it and the perfection of their condition.

To such a man and such a benefactor the College owes an incalculable debt; for the substantial value of his gift is enhanced by the noble sentiment that prompted its bestowal. It was the offspring not of a momentary impulse, but of a well-considered purpose, and was maintained by the devotion and liberality of many years in the hope that it might incite the medical profession to seek that higher culture upon which its dignity and its usefulness depend.

*Resolved,* That a copy of this Minute (if approved) shall be sent to the family of Dr. Lewis, attested by the President of the College, and that a suitable memorial of him be placed in the division of the Library that bears his name.

# INFLAMMATION OF THE VERMIFORM APPENDIX: ITS RESULTS, DIAGNOSIS, AND TREATMENT.

## TOGETHER WITH THE REPORTS OF SEVEN CASES OF EXCISION OF THE VERMIFORM APPENDIX FOR PERFORATIVE APPENDICITIS, WITH EXHIBITION OF FIVE OF THE PATIENTS.

BY THOMAS G. MORTON, M.D.

[Read January 1, 1890.]

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WHEN the abdomen is believed to contain pus, whether intra- or extra-peritoneal, encysted or diffused, the rule of surgical procedure now is to make a section, remove the offending organ or the sloughing tissue or pus, thoroughly cleanse the surroundings, and drain.

This method has also been practised in the treatment of suppurative peritonitis; in perforating ulcer of the intestine, whether typhoid, tubercular, traumatic, or simple in character, and, more recently, in those inflammations and abscesses called perityphlitic or pericæcal, which now are acknowledged to be almost invariably the result of some form of appendicitis. It is to the latter affection that I wish to call attention this evening, and, in doing so, to present a number of patients from whom I have removed a diseased appendix vermiformis, which in every case had given rise to peri-appendicular abscess threatening general suppurative peritonitis, which, indeed, in several had already begun.

Laparotomy for perforative appendicitis, with removal of

the organ, is now an established surgical procedure, and yet so recently has this operation been introduced that I am able to present the patient upon whom I operated in April, 1887, for pericæcal abscess with peritonitis, which I believe represents the first successful operation for the removal of the vermiform appendix in a case of this kind, based upon correct diagnosis.

It is true that Hall, of New York, in 1886, in an abscess associated with right inguinal hernia, after evacuating the abscess, had discovered and removed an ulcerated appendix, and the patient recovered; but the diagnosis of perforative appendicitis was not made until after the abscess was opened. More recently, a number of cases of excision of the appendix have been reported by Weir, Treves, Nancrede, and others.

In the case to which I have referred and now present, general peritonitis was developing; the history and symptoms indicated abscess, and pointed to the appendix as the cause of trouble. Upon incision, an abscess cavity was entered at a depth of an inch or more below the external surface, a free flow of pus followed, and the cæcum and its diseased appendix, which was perforated, came into view. The latter was excised, the peritoneal cavity washed free of pus and drained, with immediate relief and prompt recovery.

I have operated since upon six other cases: of these seven, five recovered and two died; of the latter, both were unavoidably operated upon *in extremis*, and although dying within a few hours, the fatal termination was in nowise, I think, hastened by the operation.

Each case presented a distinct history of a number of previous attacks of pain in the ileo-cæcal region, which occurred generally at irregular intervals, covering periods varying from a few months to several years.

Four were males, and three were females; their ages were respectively nine, eleven, seventeen, twenty-six, twenty-eight, thirty-four, and fifty-two years. The final attack, during which perforation took place, presented symptoms very much alike in each: intense local pain, increased on pressure, distention

of the ileo-cæcal region, fluctuation of temperature, slight rigors or marked chills, moderate or decided sweating, acceleration of pulse, coated tongue, constipation, and a depressed, anxious facial expression.

No tumor could be detected in any case, but in one instance there was some deep hardening of the tissues. Percussion in this, as in fact in the other cases, was markedly tympanitic.

A lateral incision was made in each, and the peritoneal cavity was found invaded by pus in four of the cases. In all more or less intestine came into view, either as part of the limiting abscess wall or penetrating the opening through it to the general peritoneal cavity. The appendix was found attached its entire length to the cæcum in three cases, and quite free in the other four.

Fecal concretions were found in every case but one, either lodged in the perforation or free in the abscess or peritoneal cavity.

The abdominal cavity of each was washed out and drained from the lowest part of the pelvis. The abscess cavities were treated by irrigation and partial curetting. The wound of operation was brought together by interrupted sutures of silk, but in each case, owing to increased tension, some of the sutures had to be cut within twenty-four hours, and healing by granulation took place. From the time of operation the symptoms were invariably promptly relieved. Convalescence was uneventful except in one instance, which will be referred to again.

The operations were performed at periods varying from the third to the ninth day after the first symptoms had appeared.

The post-operative treatment consisted, in a general way, in keeping the abdominal cavity drained and the bowels acting freely.

Hypodermic injection of morphine was reluctantly used upon two occasions, shortly after the operation, to relieve pain and restlessness.

Milk and broths were freely given, while stimulants and

quinine were early required. The histories of these cases are briefly as follows:

CASE I. (Exhibited.) *Appendicitis; perforation; perityphlitic abscess; general peritonitis; laparotomy; excision of the vermiform appendix; recovery.*—This patient was under the charge of Dr. Frank Woodbury, with whom and Dr. James C. Wilson I saw the case in consultation. Charles M. N. K.; aged twenty-six years; born in Philadelphia; a paper-hanger; not married; of spare frame; had always had good health, except that for the last three or four years he had been subject to sudden and severe attacks of abdominal pain. These attacks came on without warning while he was in excellent health, and would completely prostrate him. The pain was of a stabbing character, and most intense across the lower part of the abdomen and around the umbilicus; it was attended by great irritability of both rectum and bladder; sometimes there would be diarrhœa. These attacks, after lasting a few hours, passed away gradually, leaving him rather weak for a short time; but he rapidly recovered, and enjoyed uninterrupted good health until the next attack came on. He consulted Dr. Woodbury on the 20th of April, 1887, complaining of having taken cold; looked haggard, skin and conjunctivæ rather sallow, tongue coated, no appetite, bowels constipated, frequent micturition, and was passing a remarkably large quantity of pale urine. At this time he did not complain of abdominal pain. He was given fractional doses of calomel and sodium bicarbonate with pepsin, and was directed to keep his room. The urine contained a large proportion of albumin (one-fifth on boiling), and under the microscope showed many leucocytes and a few hyaline casts.

*April* 22. Nauseated during the night; bowels moved satisfactorily; great irritability of the bladder; much prostration.

23*d*. Spent the day lying upon a lounge; complained of abdominal pain; had not slept, and was very restless.

24*th*. During the night had suffered intensely and did not sleep; several copious movements; pain persisted; point of greatest tenderness about midway between the umbilicus and the middle of Poupart's ligament. A resisting mass could be detected upon pressure in this locality, but examination caused severe pain. Temperature 103.5°; pulse 140.

25*th*. Had a very bad night; pain in right iliac region excruciating, swelling somewhat larger, very tender; skin not discolored. Dr. James C. Wilson saw the case in consultation; diagnosis, either intussusception or perityphlitic abscess. Leeches were applied over the spot of tenderness.

27*th*. Symptoms continue about the same; general condition poor; face pale; features pinched; beads of perspiration on forehead. I was called and advised operation. At this time his condition was discouragingly wretched, that of a man in the dying stage of purulent peritonitis. At 2 P.M. performed laparotomy; the field of operation was cleansed with soap and water,

and neighboring hair removed; the surface was again washed with ether, followed by corrosive sublimate solution (1 to 2000). The usual antiseptic precautions were observed as to instruments, and the field was surrounded by towels wet with the mercuric solution. The incision was made directly over the swelling, and finding the deep muscles infiltrated with pus, it was extended until it measured nearly ten inches; commencing just above, and two inches to the right of the umbilicus, it continued obliquely downward nearly to the pubes. The peritoneum was opened and a free flow of pus followed, having a decided fecal odor; general purulent peritonitis present. In the abscess cavity, near the appendix, was found a fecal concretion about the size of a cherry-stone. The vermiform appendix was greatly swollen, and exhibited a perforating ulcer extending three-fourths around in circumference, and very near to the point of origin. A silk ligature was applied close to the cæcum and at the terminal portion of the appendix, and the intervening portion, comprising almost the whole organ, was removed, together with a large portion of omentum which projected into the abscess cavity, the walls of which were then scraped with a curette and douched with simple hot (110°) water. The peritoneal cavity was likewise douched until free from pus; and a drainage-tube was carried into the lowest part of the pelvic basin.

Following the operation, he entered upon convalescence, which was uninterrupted. He was free from all pain; the bowels moved naturally. The temperature fell after the operation, and did not again rise above 100°. The drainage-tube was removed piecemeal, the last portion being taken away on the fifteenth day. Went out May 21st. His recovery was assured by careful nursing, and by the administration of milk and small quantities of prepared liquid foods.

CASE II. *Appendicitis; perforation; perityphlitic abscess; general peritonitis; abdominal section; excision of appendix; death.*—This case I saw in consultation with Dr. Edward G. Stone, of Philadelphia, and operated upon it for him. Mrs. G.; æt. thirty-four; mother of one child; had been perfectly healthy up to time of last illness, save for occasional attacks of colic, which had readily yielded to anodynes. It was said that she had had a severe attack of pain and vomiting some months before. For two days previous to February 18, 1887, she severely exerted herself while the menses were overdue. On that day she had severe abdominal pain accompanied by vomiting. The pain was described as starting in the right hypochondriac region and darting to the umbilicus. No tumor was perceptible, neither was there tenderness upon pressure. Anodynes and counter-irritation were ordered. February 19th, pain less; no emesis nor rise of temperature; some soreness and tenderness to the right of the umbilicus. Pain returns as anodyne effects pass off. Bowels have not moved for several days. Abdomen somewhat tympanitic, tongue coated and dry at tip. Evening temperature 100°; pulse 90. Treatment continued.

*February* 20. Restless night. Vomits yellow material freely. Abdomen

tympanitic and tender. Temperature 101°; pulse 110. Operation urged but refused.

*21st.* Symptoms continue. She is more quiet but weaker. Abdomen very large and tender. On the morning of this day I first saw the case, and, although her condition was very unfavorable, urged abdominal section as her only chance for life. My diagnosis was perforated appendix and subsequent peritonitis.

Free incision was made laterally over the cæcal region, and the appendix found greatly enlarged and perforated in two places, each hole measuring a little more than one-fourth inch in diameter. A silk ligature was placed upon the appendix close to the cæcum, and the offending organ then removed. There was also present diffuse purulent peritonitis. The abdominal cavity was thoroughly irrigated, the region of abscess cleansed, and a drain inserted. She died in a few hours.

CASE III. *Appendicitis; perforation; perityphlitic abscess; general peritonitis; abdominal section; excision of appendix; death.*—On the 13th of January, 1888, I was called in consultation with Dr. B. Trautman, of this city, to a child nine years of age. It seemed that she had suffered from headache and frequent attacks of pain in the abdomen. She attended school until just before Christmas, when she had a severe colicky attack, but subsequent to this was apparently quite well, and on December 31st was out with her sled for several hours. On January 6th she was seized with nausea, abdominal pains, and developed high fever. After this she was so much better that she was down stairs, and ate of sausage and rolls. Soon after she was seized with violent abdominal cramps, the right iliac region being exceedingly painful. Upon January 12th she had an attack of pain which was most excruciating in character. The following day, when I first saw her, the condition was wretched, almost that of collapse, but not to such an extent as to justify denial of her only chance of life, as I had diagnosticated peritonitis originating in a perforated appendix and advised operation. Upon making lateral abdominal incision, as soon as the peritoneum was opened a great flow of putrid pus took place, then the cæcum and appendix came into view; the latter was greatly swollen, and both it and the cæcum were covered with greenish-yellow pyogenic membrane and lymph. The appendix was gangrenous for some distance, and its end had sloughed off. One foreign body was found in the abscess cavity, another was partly held in the sloughing end of the organ, while two other concretions were in the canal near the cæcum. The appendix was ligatured at its base and exsected. The whole abdominal cavity and its intestinal contents, which were in a state of purulent inflammation, were then thoroughly inundated with hot water; a glass tube was carried into the pelvis, and the wound was closed and dressed in the usual manner. The child never reacted fully, but died seven hours afterward.

CASE IV. (Exhibited.) *Appendicitis; perityphlitic abscess; incision and drainage* (1886); *recurrence of appendicitis; perforation; perityphlitic abscess; abdominal section; excision of appendix; recovery* (1888).—L. A. B., a stout girl, of healthy parentage, and with no family history of cæcal or appendicular disease, had a severe fall upon the buttocks in March, 1884. She was almost immediately seized with a terrible attack of vomiting and retching, which lasted hours. From this time until September, 1885, she suffered with extremely painful menstrual epochs, and, from time to time, when tired, had a recurrence of vomiting similar to that immediately succeeding her fall. On September 10th, during the progress of one of these vomiting spells, she experienced severe pains in the right cæcal region, the whole seizure lasting about ten days. Another attack developed on September 29th, and still others on November 10th and 23d. The latter was brought on by taking cold, and in five hours she was compelled to go to bed, and endured the most excruciating drawing pain, which radiated from the right cæcal region to the shoulder-blade of the same side. Vomiting continued for some hours. Emesis then ceased, but the pains continued off and on until January 10, 1886, when I first saw the patient. A hardening was then present in the right ileo-cæcal region. Poultices and mercurial inunctions were ordered, which gave very marked relief. She daily seemed to improve, and before March 19th had resumed her household duties. On that date she was much overworked in caring for company, and about midnight was seized with torturing pains in the region of the hardening. These continued until April 3, 1886, when I incised the now greatly enlarged mass, liberated a large quantity of fetid pus, and introduced a drainage-tube. There was apparently no communication with the cæcum or its appendix. The tube remained for a long time, and the wound did not completely close until August. Her condition, however, had meanwhile improved amazingly, and she was soon quite herself again, being up and about the house in four weeks.

After this, especially when tired out or at a menstrual period, the patient suffered with pain localized about the cæcal region. The attacks resembled colic. Three months after operation she had quite a severe attack of local pain which lasted a number of hours. These attacks, at long intervals, presented about the same characteristics. The last occurred in January, 1888, which was accompanied by more severe pain than any of the others.

During the evening of Friday, March 15th, of same year, she was taken with violent vomiting and purging. These symptoms continued all night, and through Saturday, when the pain was most intense. On Sunday her symptoms appeared grave. Pain was increased on pressure in the right ileo-cæcal region. Abdomen soft; fever; rapid pulse and dry tongue. On Monday the symptoms continued the same, with a temperature of 102°. In the afternoon the general symptoms were more serious. No tumor could be felt, pain increased. Skin was bathed with sweat. There was marked reson-

ance over the part. On Tuesday the pulse was feeble, nausea and occasional sick stomach prevailed. The other symptoms remained about the same; diagnosis of perforated appendix with abscess was then made. The same morning she was etherized and the usual lateral incision, five inches long, was made. This came about an inch further externally than the line of incision of the first operation. The deep tissues of the abdominal wall were somewhat œdematous, and just before the peritoneum was reached a large quantity of most fetid pus was liberated. At the base of this cavity the cæcum and appendix were clearly visible. The latter was enormously enlarged and thickly covered with lymph and abscess lining membrane. A large opening in the abscess wall communicated with the cavity of the general peritoneum. Through this small intestines were forced when she coughed.

The appendix was firmly attached to the cæcum, from which it was separated with some difficulty. It was then firmly ligatured with a stout silk at its junction with the cæcum and excised. The communication with the general peritoneum was then enlarged by tearing, and through it the intestines were most thoroughly washed by means of hot water irrigations. The abscess cavity proper and surrounding parts were sponged with one to one thousand mercuric solution. A glass drainage tube was then carried to the bottom of the pelvis and brought out through the lower angle of the wound, while a large rubber tube drained the abscess cavity proper and emerged at the upper extremity of the wound.

The incision was then closed and an antiseptic dressing applied. She reacted well; on the following day immense swelling necessitated cutting of all the stitches, whereupon the cæcum lay in full view at the bottom of the wound, but no prolapse of intestine at any time took place.

Great sloughs keep coming away for many days, also much pus, in spite of every effort to keep the wound aseptic. The deep glass or pelvic drain became dry on the fourth day and was removed on the fifth. From that time the wound was kept lightly packed with antiseptic material and rapidly granulated to the surface, when a few strips of rubber plaster were applied and cicatrization became complete.

Patient's bowels, from time of operation, were kept in a freely moving condition by means of citrate of magnesia and enemata. In less than a month the patient was well, and has since married. The appendix was found to be the seat of a very large perforating ulcer, situated near its cæcal attachment, but no foreign body was discovered.

Eighteen months after operation, as result of immense obesity and continued bronchial cough, a hernia of considerable dimensions appeared beneath the double cicatrix. This, however, has not increased in size, is easily kept reduced by a truss, and gives the patient scarcely any annoyance.

CASE V. (Exhibited.) *Appendicitis: perityphlitic abscess; perforation; laparotomy; excision of the appendix; gangrene of the cæcum; fecal fistula; recovery.*—Seen in consultation with Drs. Rich and Sailor, of Williamsport,

Penna. J. W. C., seventeen years of age, usual weight one hundred and eighty pounds, had a severe attack of ileo-cæcal pain sometime in November, 1887, while at school, which laid him up for three days, and in the following spring he had a similar but less severe attack. On July 4, 1888, he indulged in an enormous amount of peanuts and cherries, but felt no special inconvenience, save constipation, until three days subsequently, when he experienced colicky pains and had a somewhat watery stool. For two days there was some looseness of the bowels associated with severe cramps. At this time there developed great tenderness in the right iliac region and he could not stand erect. On July 11th, a telegram from Williamsport, Penna., reached me at Newport, R. I., but I was not able to reach the patient until the 13th, when I found him in a most serious condition. Although he had symptoms of obstruction, yet the diagnosis of perforation of the appendix, abscess, and peritonitis was instantly made. The pain, violent variations of temperature, profuse sweating, and profound exhaustion indicated pus, while the previous history of attack of colic and pain in the ileo-cæcal region, all pointed to the appendix as the source of trouble.

I promptly made a lateral abdominal section, evacuated an abscess of considerable size, and soon came upon a perforated appendix, which was closely attached to the cæcum its entire length. The end of the appendix had sloughed off, and in this disorganized tissue I found a large oval fecal concretion, which evidently had been the cause of the disturbance. Two very large portions of omentum were so constricted by lymph-bands that gangrene had occurred, and there was general peritonitis. The appendix was tied and cut off close to its cæcal attachment; two large portions of the gangrenous omentum were removed, and the abscess cavity cleansed, as were likewise the entire abdominal contents. The cæcum had very much the shape and feel of a sausage, firm and dark in color, and bound down as the result of inflammation. Thorough drainage of the abdominal cavity was secured by a glass drainage tube passing to the bottom of the pelvic cavity, while a rubber tube drained the abscess proper.

No attempt was made to approximate the wound, but its cavity was lightly packed with antiseptic gauze, with the usual dressing upon the abdomen.

The patient did fairly well after the operation; took food well, but there was no action of the bowels. Two days later he had marked rise of temperature and great restlessness; passing water frequently, and had almost constant desire to evacuate the bowels, but without succeeding in doing so. In response to a telegram stating that the patient was desperately ill, my son, Dr. T. S. K. Morton, went to Williamsport, and upon examination discovered an impaction of feces in the large bowel which extended from cæcum to anus. After some twelve hours' work with the rectal tube and half-hourly doses of calomel and podophyllin the colon was cleared of several pounds of fecal matter, and the patient's condition immediately became much improved, and continued to do so steadily until convalescence took place. At the time

of the impaction it was discovered that fecal matter was passing into the abdominal wound, and examination showed that the cæcum had given away, for two gangrenous spots were found, each about half an inch in diameter, on the uppermost part of the exposed bowel. These soon coalesced into one opening. Subsequently the patient rapidly improved and regained his usual rugged health. The wound of operation and fecal fistula closed naturally in five months.

Case VI. (Exhibited.) *Appendicitis*; *perityphlitic abscess; perforation; laparotomy; excision of the appendix; recovery.*—H. A. R., aged fifty-two; has always had good health, with the exception of a mild attack of bronchitis several years ago, which did not confine him to bed. Four months ago he had the first attack of pain in the right ileo-cæcal region; this had since recurred several times. The pains generally awakened him at night, but usually were soon relieved by stimulants. Pressure over the cæcal region always increased his suffering. On September 4th he called upon Dr. Bernard Berens, of this city, and complained of being stiff and sore all over, particularly in thighs and abdomen. His tongue was furred, pulse 72, skin moist. Was ordered calomel and opium. On the 6th he called again, with more abdominal pain, which was diffuse but this time not increased by pressure. Some difficulty in walking, also some anorexia were present, but not enough to prevent him from attending to business. On the 7th he again saw Dr. Berens, when his condition was found to be more serious. He had great pain in the abdomen, and now had tenderness on pressure; pulse 72; skin dry; was obliged to leave his business office at noon, and took to bed. At 8.30 that evening he had rigors, but not a full chill; pulse 98, temperature $102\frac{2}{5}$°, skin hot, tongue dry, abdomen distended, tympanitic, and tender to touch over its entire surface. On the 8th, had passed a good night with morphine; bowels were freely moved by sulphate of magnesia; condition of abdomen unchanged; morning temperature $100\frac{4}{5}$°; evening temperature 103°. The next day, September 9th, condition about the same, except increased pain over the appendix region. On the 10th, the morning temperature was 101°; pulse 92; facial appearance dusky; pain especially severe in right iliac region, with well-defined fulness and intense pain on pressure at that point. From the intense pain, more especially over the appendix, the slight sweat, the fluctuating temperature, the anxious facial expression, depressed appearance, and gradual increase of symptoms, the diagnosis of typhlitic abscess and peritonitis was made. At 12.30 the same day I saw the patient, confirmed the diagnosis, and at once made preparations for evacuating the abscess and excising the appendix, which was believed to be the subject of perforation. At 4.30 P. M., the usual lateral incision was made, six inches in length, directly over the site of the appendix. The abdominal walls were very thick, and it was not until the cæcum was reached that pus was found. This was exceedingly offensive and in considerable amount. It had worked its way into the right side of the pelvis. With some difficulty the under

surface of the cæcum was brought into view and two very similar masses of tissue, either one of which might, from its appearance, have been taken for the appendix, were found lying near each other and quite firmly attached to the under part of the cæcum. These masses seemed made up of fat and cellular tissue, and were about two inches long; judging from the position of the one nearest the caput coli, and the position the appendix should occupy, this one was carefully separated from the intestine, and a ligature placed upon it as near its cæcal attachment as possible, and it was then cut off. It proved to be the appendix embedded in lymph. A ragged perforation was found in it about one-fourth of an inch from its distal end. The second intestinal appendage proved to be an hypertrophied epiploic body. There was considerable recent lymph surrounding the appendix and colon. The exposed parts were carefully curetted and douched. During the search for the appendix, and subsequently in the course of the operation, the intestines protruded considerably. The abdominal cavity was very thoroughly washed out; and, subsequently, a glass drainage-tube was placed at the bottom of the pelvis, a large rubber drain was also placed up along the ascending colon. With some difficulty the intestines were returned, and the wound was finally brought together with silk thread. The temperature, three hours after the operation, was $101\frac{4}{5}°$, but gradually lessened, never reached 101° again, and on the tenth day was normal.

Three hypodermic injections of one-sixth of a grain of morphine were administered to relieve pain, two at intervals of five hours after the operation, and the last one eight hours subsequently. Calomel in doses of one-sixth of a grain was given every hour after operation until the bowels moved very freely. Milk, coffee, champagne, in small and frequently repeated doses, were given from the first, also twelve grains of quinine daily.

Great tension of the wound necessitated cutting away the sutures on the second and third days, after which large sloughs kept coming away for ten days. Healing by granulation took place. Glass drain worked out on twelfth day; the rubber one on the fifth day.

The wound was dressed and fresh cotton placed in the glass drain every four hours for the first five days, and gradually the dressings were changed morning and evening only, until final cicatrization occurred.

Convalescence was uneventful and rapid.

CASE VII. (Exhibited.) *Perforative appendicitis; abscess; laparotomy, excision of the appendix; recovery.*—On November 5, 1889, I saw in consultation with Dr. C. H. Shivers, of Haddonfield, New Jersey, and Dr. J. T. Hampton, of this city, Lemuel O., a lad of eleven years of age, who, a few days before, when playing in the garden, had been accidentally struck by the handle of a spade in the right iliac region. Intense pain followed; but the boy was not wholly confined to his bed until the day subsequent to the injury; on the fifth day there was a temperature of $101\frac{4}{5}°$, pulse 120, respiration 44, dry tongue. Right iliac region was very tense, swollen, and

exceedingly painful to the merest touch; there was no pain in any other part of the abdomen, no localized tumor, and not the least dulness on percussion; the bowels had been kept opened by salines. The boy had two days before a slight but positive rigor, which was followed by decided perspiration; careful inquiry brought out the fact that, on very many occasions during the previous two or three years, he had had sudden attacks of colic, which had been ascribed to "internal hernia." The pain had always been located in the appendix region. During the intervals of the attacks he had been quite well. With this history, I felt convinced that there had been chronic appendicitis, with probably a foreign body in the organ, and that the injury produced by the blow of the spade-handle had lighted up an attack of acute inflammation in the already diseased appendix, which, becoming ulcerated, had ended in perforation; and, although all the symptoms of abscess were not present, yet that unquestionably pus had formed, and, since the patient had progressively grown worse, danger of extension of inflammation or of the abscess opening into the peritoneal cavity was very great. Hence I was able to confirm Dr. Shivers's able diagnosis, and to urge—as he had already done and for which I had been summoned—an immediate operation. Lateral abdominal section was performed on November 6th. The incision began an inch above the middle of Poupart's ligament, and was continued upward and outward four inches; on reaching the colon (the tissues were all normal so far) and turning it up in search of the appendix, an abscess was found which contained an ounce and a half or two ounces of very fetid pus. The appendix was found glued to the cæcum; it was enlarged, thickened, covered with lymph, and presented a perforation about a quarter of an inch from the extremity. In the perforation was found a small fecal concretion. A silk ligature was placed on the appendix close to its root, and the distal extremity was excised. The peritoneal cavity was then flooded with large quantities of recently boiled water; a large glass drain was carried through the coils of the intestine to the bottom of the pelvis, and a rubber drain was placed in the abscess cavity alongside of the colon; then the wound was brought together with silk sutures, and a dressing, held in place by a four-tailed binder, was applied. Milk was given at short intervals, and bowels were kept freely open by calomel and salines. Convalescence was uninterrupted. The day following the operation there was great tension of the wound, and all the sutures were cut, leaving the wound gaping open. Peroxide of hydrogen worked like a charm in keeping the wound and drain sweet and clean and in assisting slough separation.

The rubber drain was taken out on the third day, and the glass drain worked out on the ninth day. The wound was closed on the twenty-eighth day, and the boy was about the house during the fifth week.

In presenting the foregoing cases, I feel warranted in making a few practical observations upon the operation of removal of

a diseased appendix; its relations to typhlitis and peritonitis; and especially upon the time and indications for operation, with the details of treatment before and after operation. One thought naturally presents: it is that only a short while ago, under the ideas then prevailing with regard to the treatment of such cases, each of the patients here presented would either have perished, or would be living in constant fear of the repetition of an attack which might at any time prove fatal. If we review the progress of this operation of exposing the diseased appendix and excising it, thus removing the cause of repeated attacks in simple or in perforative appendicitis, it is interesting to note the gradual development of the procedure.

Mr. Hancock, of London,[1] in 1848, appears to have been the first to urge operative interference in perityphlitic abscess by free incision and drainage, but this did not meet with much favor until it received the endorsement and able advocacy of Willard Parker,[2] in 1867.

In 1878, Sands, of New York, was able to report twenty cases treated in this way, and in 1883, William Pepper, at a meeting of the Pennsylvania State Medical Society, presented the statistics of one hundred cases contributed by Noyes, of Rhode Island. From these, and numerous other contributions to the literature of the subject, it was fully and finally demonstrated that surgical interference in cases of so-called perityphlitic abscess largely reduced the mortality of this affection. This was a decided step in advance upon the old method of non-interference, which, strangely though it may appear, is still advocated in some medical text-books. Surgical writers, on the contrary, now generally urge early operation, which, as has been shown, does not increase the risk to the patient, but places him in a position greatly more favorable to recovery.

After the remarkably successful abdominal surgery of Tait, Keith, and others, had shown that the peritoneal cavity might be opened and explored with comparative impunity, it was but

[1] London Medical Gazette, 1848, p. 547.
[2] Medical Record, N. Y., 1887.

natural that surgeons should be led to apply the same rules to the treatment of perityphlitic abscess, and open it more freely than before; then to explore its cavity, examine the vermiform appendix, and to amputate this unnecessary and dangerous organ when the subject of appendicitis or ulceration, whether perforating or not. This has been the final step in the operative treatment of perityphlitis.

To the diagnosis, indications for operation, and details of treatment before, during, and after surgical interference, I shall now direct attention.

*Diagnosis.*—One of the earliest and most constant symptoms of acute appendicitis is pain, which may be slight or stabbing in character, and usually is increased very much by pressure. It comes on in attacks or paroxysms (which may be years or months apart), during which there may be nausea and even vomiting, but not necessarily. The temperature is slightly elevated; constipation is commonly present; the pulse is generally accelerated ; the ileo-cæcal region may be tympanitic, or it may be more or less dull. These symptoms sooner or later may disappear, and convalescence be established, but a relapse or recurrence would indicate that a source of irritation continues. After a variable period the attack is renewed, and perhaps with graver symptoms, or, during an apparently mild attack, the sudden advent of violent local and constitutional symptoms announces very positively the occurrence of inflammation of the appendix, with pus-formation, or peritonitis.

The fact of occurrence of an attack of appendicitis, although apparently entirely recovered from, is serious enough to give rise to apprehensions for the future, for the patient is liable at any time, from a blow, fall, undue exercise, straining, indigestion, or even without apparent cause, to have a recurrence of irritation in the appendix, which may terminate in inflammation, ulceration, and perforation. The number of attacks or relapses or recurrences, before ulceration takes place varies, but when several have occurred, it is almost certain that the appendix is seriously diseased. After one or more attacks the

patient may remain apparently well; but, as a rule, this is not the case, and attack upon attack at gradually shortening intervals very conclusively demonstrate that the appendix is the source of the trouble, and that perforation, if not actually present, is liable to occur at any time. The subject of such an attack may occasionally recover without surgical interference, through atrophy of the organ or adhesion to the cæcum with more or less complete obliteration of its calibre. But such a favorable result must be the great exception in the vast number of cases, and its occurrence in any given case cannot be depended upon.

In cases presenting the symptoms above mentioned, pain, tenderness, deep swelling, or tympanites in the appendix region, associated with prostration, nausea, fever, and constipation, these phenomena coming on suddenly, and especially where there has been a history of previous attack, such an array of symptoms would warrant the diagnosis of appendicitis. When to these symptoms is added a sudden accession of intense pain increased on pressure in the right iliac region, with perhaps moderate pain over the rest of the abdomen, a fluctuating temperature reaching 102° or perhaps higher, slight rigors or decided chills, moderate perspiration or decided sweating, and an increase of tympany over the peri-cæcal region, unquestionably there will be found pus.

It is also usual in abscess formation to have a dusky or sallow skin, an anxious expression, and prostration.

In a case presenting the symptoms of pus, with a history of former attacks of pain, or relapses, *it is certain that we have to deal with an abscess*, the result of appendix perforation.

In case of doubt, rectal exploration might be cautiously resorted to, but, owing to the sigmoid flexure being attached upon the left side, it would only rarely occur that this could yield any positive information.

In a small recent abscess it is scarcely probable that it could be discovered through the rectum, while if the abscess was large and encysted there would be no difficulty in detecting it through the abdominal walls.

The use of the aspirating needle I mention but to condemn. It should *never* be used, for, if it does not find pus we cannot be sure that none is present, while its own dangers are not inconsiderable. It is in these cases a poor and especially unsafe diagnostic resource.

*Differential Diagnosis from Disease of the Cæcum.*—From disease of the cæcum the diagnosis of appendicitis cannot always be clearly made, so close is their relation; both giving rise to local disturbance in the right iliac region.

In the region under consideration we have the cæcum and vermiform appendix; both are invested through more or less of their extent with peritoneum; both organs are subject to irritation, inflammation, ulceration, and perforation. *While it is extremely rare to have a perforation of the cæcum*, it is just the reverse as to the appendix. Abscess around the cæcum *in almost every case is due to appendix disease;* even in those cases where cæcal perforations have occurred it is highly probable that they may have resulted from previous appendix perforation or disease. One such case came under my observation. On the second day after the removal of a gangrenous appendix, feces came from the wound in considerable amount, and upon careful inspection two gangrenous perforations were found involving the anterior and lower part of the cæcum. At the time of the appendix-removal the cæcum and colon were somewhat impacted, and the violent inflammation about the appendix had extended to and involved the intestines, gangrene resulting, due in part to contiguous inflammation and also in part to *impaction.* But if this abscess cavity had been simply opened and the appendix not reached, the subsequent appearance of feces would at once have established the diagnosis of simple cæcal perforation, while the appendix disease would have been overlooked. So that in supposed cæcal perforations, primary ulceration of the cæcum being extremely rare, the probability is that it is secondary to appendix disease.

Between perforative cæcitis and perforative appendicitis, the history of previous attacks of pain would make the diagnosis in favor of the latter, even without the history of relapsing

typhlitis, it would be fair to accept the diagnosis of appendix disease, for cæcal perforations are exceedingly rare indeed, but three or four such cases have, it seems, been reported and verified by post-mortem. The necessity for abdominal section is the same in both, so that the diagnosis can be left open in cases of uncertainty until section is made.

*From Acute Intestinal Obstruction.*—A careful examination of the patient will usually exclude fecal impaction, intussusception of the bowels, internal strangulation, or volvulus. In ordinary fecal impaction there are no general symptoms, although there may be nausea or vomiting; there is no special pain or tenderness, and the outline of the colon can be made out by palpation. There is usually a history of increasing constipation for weeks or months previous. Intussusception is accompanied by frequent desire to empty the bowels, with discharges of mucus or blood; the tumor is sausage-shaped and is not very tender; and the true character of the case may often be discovered by rectal examination. In volvulus there is more pain, but it is referred to the neighborhood of the umbilicus; there is neither pain nor tenderness in the iliac region. Strangulation may be caused by diverticula and frequently by constriction bands, the sequence of former peritonitis. The intestines may be adherent to the omentum and become revolved upon it. In one case an adherent appendix vermiformis strangulated the ileum. Obstruction may also be simulated by enteritis or peritonitis, owing to the paralyzing effect upon the bowel. When the obstruction is intestinal the symptoms advance very rapidly, even more so than in appendicitis.

*From Spinal or Perinephritic Abscess.*—Attention to the history of the case and to the local signs of disorder will enable us to diagnosticate these forms of abscess. The treatment being almost identical, at least as far as laparotomy is concerned, we need not waste much time in making refinements of diagnosis, although such diagnosis can generally be made. In the following case, it was not positively made until some time subsequent to the operation.

In November, 1888, I saw in consultation with Dr. Bartleson, of Clifton Heights, a young man twenty-eight years of age, who had been confined to his bed for three weeks, and presented symptoms of pus formation in the inguinal region. His temperature fluctuated between 100° and 104°; he had sweatings and pronounced chills; yet the pain, which was local, was not severe, but it was increased by pressure. He had no history of former pain in the appendix region. There was, however, a tumor which could readily be made out, but at a considerable depth: I decided to explore this by operation. Incision opened into an abscess, but the cavity seemed closed, and it was not so deep as I had usually found in suppurative appendicitis. Neither the cæcum nor the appendix came into view, nor could they be found in the cavity or its borders. The pus cavity was drained, and subsequently closed. The case subsequently proved to be one of psoas abscess, originating in the lumbar vertebræ, but no positive diagnosis could be made for several months after operation, by which, nevertheless, he was completely cured of both abscess and the spondylitis.

In psoas abscess, especially in young children, some difficulty may be experienced, at times, in differentiating it from pericæcal inflammation. But in the former there is generally a history of long present ill-health and pain in the dorsal region, usually with symptoms of vertebral disease (*i. e.*, gastric irritation, intercostal pains, constriction bands, or pains in the thighs). The pains are colicky and associated with flatulence; and there is more or less pain or irritation of the bladder. Abscess from disease of bodies of the spine generally points in the groin, either just above or below Poupart's ligament; it is associated with a history of ill-health, and difficulty in walking. Iliac abscess may occur unconnected with the spine or cæcum; arising within the abdominal cavity near the spine. In such cases the symptoms of systemic disturbance are quite decided: chill, more or less pronounced, with hectic fever and night sweating are very apt to occur. As soon as the ex-

istence of pus is recognized, an exploratory incision should be made in order to detect the source if possible.

*Tumors* may appear in this region, both malignant and non-malignant, and their nature may be inferred from their physical characters and the clinical history, which shows their gradual increase in size, etc.

The history of the mode of onset or invasion of the disease will be of service in making its diagnosis. Strangulation of the bowel, intussusception, peritonitis, volvulus, generally come on very suddenly. Impaction of feces, psoas or iliac abscess, and tumors come on gradually. Cæcitis and perforative ulcer of the cæcum are also more or less rapid in their course, and point superficially more quickly than does the abscess to which appendicitis gives rise.

*Treatment.*—The treatment of pericæcal inflammation, no matter whether its origin is in or about the cæcum or in the appendix, may be divided into two divisions, that of the pre-purulent and that of the post-purulent stage; or, first, before formation of pus or of appendix perforation; and, secondly, after that event.

The treatment of the pre-purulent, irritative, catarrhal, or simple inflammatory disorders of the cæcum, its surroundings, or the appendix, should consist in absolute rest in bed, restriction of diet to nourishing liquids, hot poultices or fomentations frequently replaced upon the parts, perhaps local depletion, and possibly the hypodermic exhibition of morphine to control pain; while the bowels should be kept open and free from accumulations of gas and feces by the admistration of calomel or salines and enemas.

Prompt resolution should take place in cases which are not to go on to the stage of pus formation. Tedious recovery, relapse, or recurrence of symptoms, would point to the probable presence of conditions exceedingly dangerous to the patient from the liability to general peritonitis or perforation at any time; any further, they would point, as a rule, to the appendix as the source of irritation and danger.

That treatment of pericæcal inflammation which places the

bowels "at rest" from the start, or in "splints," commonly so called, has probably been the cause of more serious, often fatal, results than can well be estimated. The use of opium without question masks the symptoms which indicate pus-formation, causing loss of diagnostic symptoms and of valuable time at a most critical period; the apparent improvement due to lack of pain, often causing postponement of operative interference until the patient is practically in a hopeless condition. Intense pain is more often an indication for operation than for morphine; the knife will remove both pain and danger and give radical relief for all time, as recurrence cannot occur when the cause of the malady, the appendix, has been removed.

In the second division, the process has gone beyond the simple irritative or inflammatory stage and pus has formed.

Pus in contact with, or in the cavity of, the peritoneum (and such is precisely the situation in abscess surrounding the appendix or cæcum) is vastly more serious than would be an abdominal section for its relief. So the diagnosis of pus having been made, and, indeed, often without positive diagnosis, operation is positively indicated; many other risks are to be taken rather than those of general purulent peritonitis, for early interference will save almost if not all cases from this much dreaded complication, while the danger of operation becomes slight compared with that of general abdominal inflammation.

Local or general peritonitis supervening in a person who has a history of cæcal trouble would more than justify operation.

At a later, or even, perhaps, in the chronic stage of the disorder, all available diagnostic skill must be exerted when pericæcal abscess may have pointed in an anomalous situation, and we must ever adhere to the modern surgical rule, always to attack pus at its source if possible. When the cæcum is normally placed, this is always feasible, if the disease be recognized.

*Preparation for the Operation.*—There is generally, from the very nature of the case, very little time for any special preparatory treatment.

The field of operation should be made clean with soap and water, then shaved, washed with ether or turpentine, soapsuds again, and then douched with a mercuric chloride solution (1 to 1000); the umbilicus having been carefully cleansed and its cavity rubbed with iodoform.

If possible, the disinfecting process should be completed some hours before, and the abdomen kept covered with a wet bichloride dressing. The field of operation should be protected by towels wrung out of hot mercuric solution.

The instruments should be treated by boiling, and then kept in a three per cent. carbolic acid solution, or used from cooled boiled water.

The operator and his assistant—one is sufficient—should likewise observe the rules of strict antisepsis, which should rigidly prevail throughout.

*Operation.*—The line of abdominal incision should be lateral, not median. The advantages of the former are very obvious and positive. It is made directly over the appendix region and abscess cavity. If a median incision were made the peritoneal cavity would not only be often needlessly opened, but the section would be at a point remote from the cæcum and appendix, in a position in which they cannot well be reached. Indeed, it would often be quite impossible to deal with a diseased appendix unless the incision were lateral, for the difficulties experienced in bringing into view and separating this organ when it is firmly bound by adhesions to the cæcum, as is often the case, are not inconsiderable. If pus have gained access to the peritoneal cavity, or the intestines come to view, thorough cleansing can be effected as well by a lateral incision, while the sloughs of cellular and other tissues, which always may be expected from the abscess cavity and surrounding parts, can more readily discharge through an opening contiguous to the disease.

Usually there occurs within a few hours after operation

great swelling of the wound and ileo-cæcal region. This requires removal of the sutures; the wound gaps and the cæcum is fully exposed, but the latter is held naturally in position, and there is no danger from intestinal protrusion; drainage by such a free opening is proportionally favored.

The incision should be from four to six inches in length and correspond with the appendix region; it should extend from an inch above the middle of Poupart's ligament upward through the right linea semilunaris and down until peritoneum, cæcum, or pus is reached. Occasionally pus is not discovered until the cæcum is displaced, when the abscess cavity and the appendix come in view. Bleeding should be arrested by the use of hæmostatic forceps and the application of hot water.

I have found that the appendix is normally situated immediately under a point two inches distant from the right anterior superior iliac spinous process, on a horizontal line, drawn from this process toward the median line of the body, so that this incision is directly over the organ. When the abscess cavity is reached, gas may be first discharged, then, when pus, which is always offensive, has been reached and sponged or washed away, the appendix is found either lying free or attached to the cæcum or abscess wall. It is is not always an easy matter to distinguish the appendix; on one occasion this organ and an epiploic appendage, each the same size and resembling each other in general appearance, were side by side and both firmly glued to the cæcum. The most inferior of these bodies was correctly judged to be the appendix. The anatomical relations will always differentiate the appendix.

Irrigation with recently boiled or distilled water at a temperature of 105° to 110°, gives a clear view of the surroundings of the cæcum and its appendix; at this time it may be necessary to enlarge the wound in order to obtain sufficient space to conduct the necessary manipulations; this will be found especially indicated when the appendix is more or less firmly glued to intestine.

The appendix is practically always found to be the seat of

trouble; in any case it should be excised; unquestionably so if swollen, inflamed, perforated, containing masses of feces, or harboring foreign bodies.

The removal of the appendix after gently freeing it from any adhesions which it may have formed can best be accomplished by ligaturing it close to its cæcal attachment with a silk ligature, and excising it just outside the point of ligation. If the general peritoneal cavity has not been involved by the abscess nor during the necessary manipulations of excising the appendix, the abscess cavity should simply be washed out with a mercuric chloride solution (1 to 1000), and a good-sized rubber drainage-tube carried to the bottom of the cavity, and brought out near the most dependent part of the wound. In all of the cases which have come under my care the peritoneal cavity has been invaded by pus, either before or during the operation, so that the entire abdominal cavity had to be thoroughly cleansed and drained. Irrigation of the abdominal cavity can best be accomplished by a fountain (or other form of) syringe, carrying sterilized water of a temperature of 105° to 110°. Every part of the abdominal cavity should be thoroughly and repeatedly drenched if pus has entered it.

Should far-advanced peritonitis be found, the intestines must be withdrawn, and all adhesions parted with the finger or knife during the process of cleansing and before they are returned to the peritoneal cavity.

In any abscess of the ileo-cæcal region we should always suspect appendix disease, and an effort should always be made to expose this organ. In no case should a simple evacuation of pus be considered sufficient, especially if the history of the case presented any account of probable former appendix trouble. A case of this character came under my care, in which at first, in 1885, I simply evacuated an abscess situated in the ileo-cæcal region, and made no investigation of the appendix, as the abscess cavity seemed a closed one. Three years later I was obliged to make abdominal section and remove a diseased appendix, which undoubtedly had existed at the time of the first operation.

Cæcal perforations should be cleansed, curetted, and closed by Lembert suture. If this be difficult or impracticable from the position of the perforation or otherwise, no danger need be apprehended, for such fistules close naturally; one such complication occurred in a case in which I excised a sloughing appendix. At the time of operation the cæcum seemed somewhat distended and its color unnaturally dark; forty-eight hours afterward feces were observed in the wound, which was sufficiently open to see a gangrenous perforation; the fistule gradually contracted, but continued discharging a small amount of intestinal contents for some months, when it permanently closed of its own accord.

If the inflammation should be found in the cæcum itself, due to the presence of a foreign body or to impaction of the feces, they should be either excised or urged by prudent force along the bowel.

In their operative removal a simple incision, afterward united by Lembert sutures, would answer every purpose.

When the general peritoneal cavity has been involved by the abscess, or broken into during operation, it requires, after cleansing, to be drained, and for this purpose a large, glass, perforated tube, slightly curved (Keith's), is carried down between the coils of intestines to the most dependent part of the pelvic cavity and allowed to emerge at a convenient point near the lower part of the wound. It is safer in all cases also to insert a perforated rubber drain to the bottom of the abscess cavity. The wound is then brought together by interruptedsilk sutures.

A piece of protective tissue perforated for the tube exit is then applied to the wound. To the bottom of the glass tube is carried a cotton rope which absorbs the secretions, and over its outlet a wad of cotton is placed and enveloped in rubber tissue in the usual manner. Iodoform is now dusted over the wound surroundings and a large dressing of wet bichloride gauze and cotton is then applied and held in position by a four-tailed flannel binder.

*Post-operative Treatment.*—After the effects of the anæsthetic have passed over, a hypodermic injection of morphine may be

required to relieve pain, or check vomiting or restlessness. The ordinary rules of abdominal surgery are to be observed. The cotton rope should frequently be changed, generally every three hours is sufficient for the first few days; before it is replaced the tube should be irrigated with boiled or distilled water, peroxide of hydrogen, or weak carbolic acid solution, especially when, as is often the case at first, the secretions are more or less offensive.

Milk should be given at short intervals, and in small doses, and stimulants are, as a rule, early required; if there has been much exhaustion champagne should be freely given.

It is important that the bowels should be promptly opened and kept so; and for this purpose small doses of calomel should be given, say $\frac{1}{12}$ or $\frac{1}{6}$ of a grain hourly or half-hourly, with an occasional $\frac{1}{8}$ grain dose of podophyllin; after this salines can be substituted. Quinine and the malt extracts are strongly indicated. Opium should not be used in any form internally; morphine in small doses hypodermically rarely may be required subsequent to operation to relieve pain or restlessness, but should be regarded as a *dangerous agent* and used with great reluctance.

It will usually be found that the cellular tissues surrounding the abscess are hopelessly infected and necrotic, perhaps for a long distance; it will likewise be found impossible adequately to remove or cleanse them. Hence the wound will almost invariably run a foul septic course, great sloughs will keep coming away for many days, and it will eventually, in from six to eight weeks, heal firmly from the bottom by granulation and cicatrization. I have advised, nevertheless, that the wound always be primarily sutured, for by so doing and subsequently cutting suture after suture as the wound becomes tense, we secure an anchorage of the cæcum in the bottom of the wound by lymph exudate which prevents prolapse or hernia subsequent to cutting the sutures, or after cicatrization.

As a rule, one or two sutures must be cut at the end of twenty hours, others subsequently as tension may demand.

When these are cut the already anchored cæcum, and perhaps other intestines, come into view as the wound widely gapes, but they show no tendency to prolapse even when the patient strains or coughs, although the latter—indeed all active motions—are to be strenuously avoided.

The gaping wound should be packed with strips of gauze which are to be frequently changed and the parts cleansed with peroxide of hydrogen until the tubes are away and the granulations approach the surface, then adhesive straps are used to approximate the wound edges. A binder, or good abdominal belt, must be worn for six months or a year after complete closure of the wound.

*Symptoms of peritonitis after operation* should be met by free saline purgation (Epsom salts, hourly or half-hourly) or by reopening and washing out the abdomen.

The time for the removal of the glass pelvic drain will depend altogether upon the amount and character of the secretion; usually it can be dispensed with by the fifth or sixth day, but frequently is retained until the tenth or twelfth. It is commonly forced out by the action of the intestines at the proper time. When it is removed, it is well to introduce in its place a small rubber drain, which can be each day brought nearer the surface and then cut away piecemeal.

The dressings should be replaced as often as they become soiled, and this is generally every six or eight hours for the first few days, afterward at longer intervals.

I have thus gone over, in a more or less brief manner, the symptoms which should guide in making the diagnosis of appendicitis and pus formation in or about the pericæcal region, and have presented in as strong a manner as possible the necessity, in such event, for early operative interference.

The details of the operation and post-operative treatment have been given with some minuteness, and this seems proper, because such specific directions have not been published.

In conclusion, it may be said that, although abdominal surgery can show many brilliant achievements, yet scarcely in any other instance does an operation so completely afford its

own justification, or, when properly timed, present such satisfactory results, as laparotomy when performed for perforative appendicitis.

## Addendum.

The preceding paper, it will be observed, has been confined strictly to a consideration of *acute* forms of appendicitis. It is proposed in this additional note to consider in brief the subject of surgical interference with chronic appendicitis and those conditions which give rise thereto.

I have long been an advocate for removal of the diseased appendix in the interval between acute attacks; indeed, so long ago as in my first writing upon this topic, I urged that recurring attacks of appendicitis, or perityphlitis, should be considered an absolute indication for removal of the appendix; preferably after entire subsidence of an acute paroxysm, when every condition is so much more conducive to prompt recovery, and primary healing of the wound. I would now again aver that recurring attacks, or persistent chronic appendicitis, whether due to protraction in milder degree of the acute seizure or even originating and continuing without intercurrent acute attacks, not only justify operation, but absolutely demand excision of the appendix to insure the future safety of the patient. For it must now be acknowledged that recurring attacks of appendicitis, usually, sooner or later eventuate in that most dangerous of acute affections, perforation of the organ and pericæcal abscess; which, likely as not, will take place when the person is situated where adequate medical relief cannot be had. How much better, then, to place him at once, and for all time, beyond the possibility of danger from this source, by a comparatively trivial operation at a time, and under conditions, when prompt and permanent relief and recovery can almost invariably be secured?

A study of the pathology of appendix disease shows that many cases commence as ulcerations of the mucous membrane of the appendix, which, with or without the formation and presence of concretions, progress to perforation, and, in either

case, originate symptoms of intermittent or continuous chronic —perhaps disabling—appendix inflammation; and, earlier or later, either in the primary or a subsequent attack, give rise to perforation, abscess, and, when improperly dealt with, to death.

I would then reiterate my belief that symptoms of continuing appendix disease, whether continuing after acute attack, or due to primarily chronic disease, or simply indicative of ulceration of the lining mucous membrane of the appendix, invariably demand excision of the offending organ.

All of the various distressing and often disabling symptoms of the various appendicular disorders, including those arising from inflammatory adhesions of the organ to neighboring viscera, are relieved, as if by magic, by excision of the appendix. This has been amply proved by the brilliant cases of Treves, Senn, Hoegh of Minneapolis, Bernardy and Shober of Philadelphia.

*Operation for Chronic Appendix Disease.*—The premeditated operation permits the careful preparation of the patient beforehand by rest in bed, regulated diet and bowels, and thorough general and local disinfection.

Incision should be made directly over and carried down through the right linea semilunaris. It should be at least three inches in extent and should be enlarged as may be required for necessary manipulation. After the peritoneum has been exposed to the full length of incision, all bleeding points are carefully ligatured with fine catgut and the wound is sponged entirely free of blood or other fluid. Now the peritoneum is incised. If the appendix does not at once present in the wound, it will be necessary to press the intestine upward with the finger. If, as may happen, the appendix is found to be partially or wholly attached to the cæcum or elsewhere, the adhesions must be separated by the finger, or, if strong, be divided between double ligatures. The appendix may be entirely free of mesentery or the latter may extend throughout its whole extent; if so, this, as it were, meso-appendix must be ligatured in portions and cut through between the

ligatures and the appendix. The latter organ is then included in a ligature at its cæcal origin and cut off.

A number of methods have been adopted for dealing with the resulting stump of appendix. If it is to remain projecting from the cæcum, the cæcal peritoneum should be brought over it and there united by Lembert sutures.

Although I have had no experience in the removal of the appendix for chronic disease, yet, from experiments made upon the cadaver with a view of getting entirely rid of the stump and hence of all subsequent danger from it, I have found that it can very readily be inverted and completely invaginated into the cæcal cavity.

The proposed manipulation consists, after ligaturing and cutting away the appendix, in grasping the stump at its distal extremity with forceps and pushing it into the cæcum; the peritoneum is then approximated over the inverted stump by means of three or four Lembert sutures which retain it in the cæcum, and effectually prevent its subsequent prolapse.

This is easily accomplished, and absolutely removes all source of danger from any future irritation in the *cul-de-sac* or that part of the appendix between the point of ligation and the cæcum. After the parietal wound has been carefully sponged and all clots removed, it is brought together by two rows of interrupted sutures; a deep set for the closure of the peritoneum and a superficial series to unite the edges of the external or skin and muscle wound. Drainage is not necessary unless under very exceptional circumstances. The external wound is to be dressed after the usual method, as previously described.

The diet for the first few days should be confined to liquids, especially milk, often and in small quantities. The bowels (which are supposed to have been opened well upon the morning of operation) need not be disturbed for two or three days, when they should be stimulated to gentle activity by mild mercurial or saline laxatives. The dressings need not be disturbed for a week or ten days, when the sutures—if of silk—should be removed. A supporting binder or abdominal belt should be worn until the cicatrix is quite firm.

## DISCUSSION.

Dr. W. W. Keen: I think that we may congratulate ourselves in one respect, and that is that this whole question of the treatment of inflammation in the cæcal region has received its solution more particularly at the hands of American surgeons. Although operation had been advised earlier than 1867, yet the paper of Willard Parker was essentially the beginning of the modern treatment of perityphlitis or appendicitis. He was the first one to make the profession hear him. It was chiefly taken up afterward by American surgeons, and up to this time the most important contributions have been made not only by surgeons, but also by physicians; in New York by Bull, Weir, and Sands, and in this city by Pepper and Dr. Morton. Recently, Senn and other physicians and surgeons have done much to establish these operations on a still firmer foundation. From a recent discussion in the Medico-Chirurgical Society of London, in June last, and an important paper by Treves, it seems that this treatment is finding favor there, and that English surgeons will adopt the same radical measures as are employed here.

At the end of his paper Dr. Morton makes a most important remark, which the majority of the profession do not fully appreciate, namely, that in every case of inflammation in the cæcal region, a surgeon should be in consultation with the physician from the moment that the nature of the trouble is recognized, in order that he may be familiar with the case and prepared to operate the moment that interference becomes necessary. Repeatedly I have been at a great disadvantage, when suddenly called, from unfamiliarity with a difficult case.

I think that the frequency of these cases is not appreciated. Some recent statistics illustrate this point well. Krafft reports 106 cases, of which 24 were examples of relapsing typhlitis at intervals of one to three years. In some the interval was as long as twenty years. Autopsy showed the presence of pus in 84 cases. In 8, operation was performed although there were no symptoms of abscess, and yet pus was found and evacuated. In 14 cases, pus was discharged by the rectum or other viscera. Matterstock found perforation in 132 out of 146 cases. Fenwick found perforation in 113 out of 129 cases. Toft reports traces of inflammation in one-third of the cadavers examined, and ulceration of the appendix in so large a proportion as five per cent.

These facts show that the operation is not uncommonly needed, but on the contrary pus is so frequently present that operation should be the rule rather than the exception. Especially is this the case in recurrent attacks. In a paper published some time since by Hünefauth, he advocates manipulation and massage of the abdomen, and reports 53 cases of cure. It seems to me, in spite of the fact that so many cases are reported cured, that from the

histories of the cases, the presence of pus and the recurrence of attacks, this is a most dangerous method of procedure, and I agree with Treves that any rough handling or even much gentle handling of the abdominal walls should be avoided rather than encouraged.

In reference to the operative procedure itself, my early impression was decidedly in favor of the median incision. But a further experience has satisfied me that the incision practised by Dr. Morton is the better. The lateral incision will reach the appendix better than the median, unless the latter is very prolonged. In a number of laparotomies, I have found that the appendix could be reached by a median incision; but I think that in the majority of instances the lateral incision is the better one.

Although I have had no experience with the treatment of the stump advocated by Dr. Morton, yet it seems to be the best one yet proposed. That recently advocated by Dr. Senn, of covering the stump with peritoneum seems inferior to invagination. With the latter method there is no danger of leakage if the silk ligature should cut its way through.

I notice that Dr. Morton spoke of curetting the cavity of the abscess in every case. I should hesitate to do this. The wall of the abscess is always in contact with the intestine, and often formed by the intestines themselves glued together, and I should be fearful of inducing general peritonitis or perforating the abscess wall. It seems to me wiser to drain than to curette, especially it it be necessary, as is sometimes the case, to reopen the wound. The drainage should always be very free, and there would be no necessity for curetting, for all the sloughs would escape through this opening. It is often impossible to remove all the sloughs at the time of the operation. In some cases I have found them coming away for a long time.

In the history of this subject we find three distinct stages: the first, that inaugurated by Willard Parker, in which these conditions were spoken of under the head of "perityphlitis" and "typhlitis." There was no distinction made between disease of the appendix and disease of the cæcum. The cases were treated as a rule simply by incision, washing out, and free drainage, and in some cases even without washing and drainage. The second stage, including only the last few years, was that in which the appendix was recognized as the source of the trouble rather than the cæcum, and the name "appendicitis" has replaced the former names referring to the cæcum. The third advance is that recently made by the recommendation of Senn, Treves, and others, that in cases of recurring appendicitis, operation should be performed in the interval between two attacks, when the patient is comparatively well and there are no inflammatory symptoms. It seems to me that this is a distinct advance, and one which the profession at large, and especially the physicians who see these cases first, should recognize. No man should be allowed to have more than one or two, or at the most three, recurring attacks of appendicitis without a surgeon being called in and exploration attempted, when the peritoneum is uninflamed and uninfected.

I think that the most remarkable cases are those recently reported by Senn, Baldy, and Bernardy, in which there was no perforation, yet although the appendix looked healthy there was found ulceration on opening it through the mucous coat, or reaching to the peritoneal coat, ready to burst in a succeeding attack. In Bernardy's case there had been so many as eleven attacks in ten months. These cases should teach us that cases of recurring appendicitis should be submitted to operation during the period of quiescence.

Dr. Price: Dr. Keen has called attention to the cases of Willard Parker and to those of Senn. These cases are worthy of the most careful study. In the former, perforation had taken place and a foreign body had escaped. In the latter, we have recurring attacks of appendicitis without perforation. In the cases of Parker the incision was made to liberate pus and to save life, and not as an ideal operation. Some of these cases would not permit an ideal operation. If it were attempted, many of them would die on the table. It is possible that in the two fatal cases reported to-night incision, irrigation, drainage, with short anæsthesia, might have saved life.

I am in perfect accord with Dr. Morton's views; they are the result purely of practical experience.

Peritonitis is the most serious condition we have to contend with in abdominal disease, and the most frequent cause of death.

The existence of peritonitis so generally in this group of cases demonstrates most beautifully the virulent result of delay, showing the great importance of promptitude in making accurate diagnosis and surgical interference, now that surgeons have cast aside the pernicious trammels of routine practice and have put abdominal surgery to a clinical test, giving unprejudiced evidence sufficient to convince the most obstinate that surgical means is the only true treatment for purulent peritonitis, whether the result of perforation, abscess, or traumatism.

Perforative ulceration of one of the hollow viscera, suppurative peritonitis due to escape of purulent or other noxious matter from collections about the appendix, is probably the most common cause of the trouble under consideration.

Peritonitis is always a trenchant argument for section, irrigation, and drainage. A prominent writer upon this subject says: "The most serious difficulty that besets us in our management of these cases of peritonitis is the uncertainty of diagnosis." He further says: "Unless a diagnosis can be made, treatment has almost no existence and certainly is of little avail." The diagnosis is either *made* or it is *not* made. Diagnoses in these cases have been commonly made, and *can be made with precision*.

Now, in regard to the treatment, the *opium* treatment has no place in peritonitis or in abdominal surgery. Not only do the cases recover in larger numbers without it, but the recoveries are much more speedy and satisfactory. The most successful surgeons wholly reject it; they dread the distressing restlessness and suppression of secretions due to its use.

It is of paramount importance that physicians as well as surgeons cease to be slaves of custom; that we no longer use any method or drug simply because our grandfathers or great-grandfathers used it; we must have some better reason. In the treatment of peritonitis resulting from perforative appendicitis, abscess, leakage, or rupture, drainage is the third statement of the argument for operation.

1st. Operation is required.

2d. Douching and flooding the abdomen are necessary.

3d. Perfect drainage is the bulwark of the whole procedure.

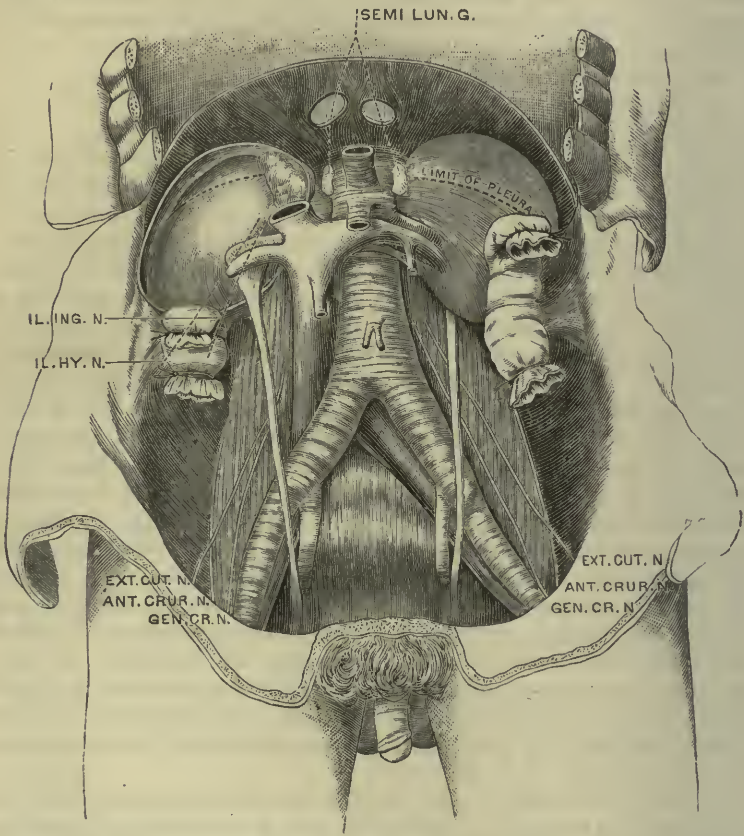
Early surgical interference is the foundation of our modern surgery. Drainage is the keystone in such cases of abdominal surgery as are now under our consideration.

There are a few things in Dr. Morton's remarks that I do not agree with. He begins by perfecting an ideal operation, and ends with the open treatment. I can scarcely understand why, after such careful separation of adhesions, curetting, and toilet he should have such extensive sloughs and require so much drainage, nor why he should have tension. This has not been my experience. I have removed the appendix both by the median and the lateral incision, and have never had tension. While I agree that in some cases the open treatment is the best, yet I do not agree with him in primarily closing the wound. The gauze drainage will be a sufficient compress to keep the bowels at perfect rest, and will be a perfect protection to the viscera. Hedra, of Texas, has recently advocated the open abdominal treatment in just such cases. I have recently had four operations in which only one or two sutures were introduced, notwithstanding the incisions were lengthy. Dr. Penrose operated in a case where half the abdomen was filled with pus, and adopted the open treatment and there was a speedy recovery. I have seen three cases in which the abdomen was filled with large gauze drainage, and in all the recovery was speedy. One of these patients was too ill to be taken out of bed. In some of these desperate cases rapid incision and rapid irrigation will save life, where, if the attempt was made to do an ideal operation, the patient would die on the table.

Dr. John B. Roberts: I have received the greatest pleasure from the paper read this evening. I expected to hear a paper which I should feel inclined to criticise because it was not conservative enough. Certainly Dr. Morton is not too rash in operating. He certainly has not gone to extremes, and gives us a most perfect account of the proper method of dealing with this class of disease.

In order to say a few words in regard to the diagnosis, I have brought with me a diagram made for a paper of mine on the surgery of the perinephric region which I read a few years ago. I wish to ask Dr. Morton in regard to the diagnosis of appendicitis whether in the early stages it is possible to diagnose perityphlitic troubles from perinephric or psoas affections and coxitis, by the difference in the distribution of the pain due to pressure upon

the genito-crural, anterior-crural, and other nerves shown in the diagram. It may be that the diagnosis may be made by discriminating between the areas of pain in these different affections. In order to avoid repetition, I




Dissection of the retro-peritoneal space showing the relations of the perinephric tissue and kidney to the diaphragm, colon, nerves, and vessels. The ilio-hypogastric and ilio-inguinal nerves, and the lowest limit of the pleura, though posterior to the kidney, are indicated by lines, in order to show the relation.

shall read an extract from the paper before referred to, *American Journal of the Medical Sciences*, April, 1883, which may call up some points in diagnosis:

"1. Perityphlic abscess is not likely to be confounded with perinephric abscess, for the tumor-like mass of indurated cellular tissue in the latter case is higher and not so easily felt by palpation of the front of the abdomen, and

there is a more marked tendency for flexion of the hip to occur. Perityphlic abscess, on the other hand, is more likely to present forward, to cause œdema of the corresponding limb from pressure on the iliac vein, and when opened to furnish fetid or stercoraceous pus and gas. The numbness of the thigh and the hip-flexion found at times in perinephric abscesses may also be found in perityphlitis.

"2. Masses of feces, and splenic or hepatic tumors may in rare instances simulate the indurated swelling due to perinephritis. The first can be removed by laxatives; the last two conditions are distinguished from perinephritis by the ease with which they are displaced downward during inspiration.

"Perinephric tumors are retroperitoneal, and therefore on the right side the ascending colon lies to the inner side of such a tumor, while on the left side the descending colon has a position in front of it."

I would ask if Dr. Morton has seen flexion of the hip due to spasm of the psoas muscle in perityphlitic disease. It has been asserted that perinephritis is often confounded with inflammation of the hip-joint and that some of the cases of coxitis reported cured were really cases of perinephritis with spasm of the psoas muscle.

The fact that the diagnosis between these affections is rather difficult was forced upon me by a recent case, in which I made an abdominal section in order to prove or disprove the presence of appendicitis or perinephritis. I found that my provisional diagnosis of perinephritis was correct. The patient promptly recovered after the operation. Whether this was due to the bleeding produced by the exploratory incision or to the fact that he was on the verge of recovery when the operation was undertaken, I cannot say. This case showed me that it was difficult to discriminate positively between inflammations of these different regions. I have now under observation a patient who was told that he had disease of the cæcum. My own impression is that he has some irritation about the kidney, probably a renal calculus.

I agree with the last speaker that we often prolong shock and kill our patients by trying to do a perfected operation. It is often the most difficult thing in surgery to know when not to continue an operation. The man who is not afraid to go ahead, and yet knows when to stop, is the ideal surgeon. That is the essence of scientific surgery. I believe that the time has come when we must not push too far ahead in the operative line, under the idea that suppuration is the only thing to be dreaded.

Dr. Morton: I should remove as far as possible all septic tissues from the abscess cavity with the curette, care being taken not to interfere with intestine when it forms part of the abscess wall. When the peritoneal cavity is involved, there is all the more reason for cleansing the abscess cavity, which would lessen the subsequent suppuration.

In regard to the abdominal incision, if the wound is not brought together, it would be in most cases impossible to avoid intestinal protrusion, and

packing the wound should not be relied upon; if the sutures remain for even a short time, adhesions take place which effectually prevent the escape of intestine; I should always, therefore, close the incision and remove the sutures when required.

In the early diagnosis we find intense pain in the region of the appendix, which is localized and increased by pressure; I have not met with the cases to which Dr. Roberts refers, but I do not think that there ought to be any difficulty in the diagnosis of perinephritic disease, nor have I seen the flexion of the thigh of which he speaks.

# OTIS'S PERFECTED EVACUATOR.

By JOHN B. DEAVER, M.D.

[Read January 1, 1890.]

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Mr. President and Fellows of the College: I take pleasure in exhibiting this, the "Otis perfected evacuator," at the same time stating his reasons for styling it "perfected."

Through Otis's discovery alone of the normal urethral calibre, the average being 32 mm. in circumference, the rapid evacuation of stone has become possible. Before attaching the evacuator to the evacuating tube immediately upon its introduction into the bladder after crushing, the fluid is allowed to flow out, carrying with it all the fragments that can thus be washed out; then the evacuator is attached to the tube, when the desired amount of water for working the instrument easily is introduced by this tube or by means of a Davidson syringe connected with the rubber bulb.

It is not found necessary to press the end of the evacuating tube downward so as to depress the floor of the bladder, and thus make the portion with which it is in contact the lowest point. The current is sufficiently strong to draw out the débris if the tube be simply well introduced into the cavity of the bladder. To prevent the water from flowing from the evacuator when laying it down (this being effected by atmospheric pressure alone in any position which the handling of the instrument requires), a plug of hard rubber is introduced. This instrument accomplishes the evacuation without return of the débris independently of traps, valves, or strainers, this being accomplished by a simple breaking of the currents to and from the bladder so that the débris is released *in transitu*

and dropped down into the receiver, which is a perfectly dead point.

The substitution of hard-rubber fittings similar to those of the Ultzmann evacuator for the metal, and the removal of all the intermediate connections between the glass reservoir, the rubber bulb and the evacuating catheter, decreases the weight and adds to the ease in handling the instrument. The weight of this instrument when filled is six ounces less than the Bigelow empty.

This instrument differs from the original Otis's:

1. In the removal of all stop-cocks.

2. In the removal of tubing between bulb and globe and between globe and evacuating tube, thus making the instrument more compact, and the distance from the bladder to the receiver the shortest possible.

3. In the introduction of hard rubber in place of metal wherever possible, giving the utmost lightness.

4. In making the tube apertures in the globe oval instead of round (Dr. W. K. Otis's suggestion), and thus giving the greatest security against their getting loose and leaking.

5. In increasing the calibre of the evacuating tube where it enters the globe, thus securing a greater rapidity in delivering.

Dr. Otis now maintains that this latest evacuator presents the following advantages over all other instruments now in use:

1. Perfect trapping of all fragments without the use of any form of valves, perforated tubes, or strainers.

2. Shortest possible route of fragments from the bladder to the receiver.

3. Absence of all stop-cocks between the bladder and receiver.

4. Ease of filling and perfect control of the amount of water in the bladder during evacuation.

5. Lightness, compactness, power, and facility of manipulation.

6. As the fragments are visible from the moment of leaving the tube until they are removed from the receiver, it can be seen that they do not return to the bladder.

# SPECIAL HOSPITALS FOR THE TREATMENT OF TUBERCULOSIS.

By LAWRENCE F. FLICK, M.D.

[Read February 5, 1890.]

One of the sarcastic flings of the sceptic at the student of the etiology of tuberculosis is that his much-vaunted discoveries have, as yet, led to no practical results in the prevention of the disease. If this is true, it is so because the lessons taught by those discoveries have not been put into practice.

The knowledge which we have gained about tuberculosis during the last few years, points strongly to the conclusion that it is a preventable disease, and that for its prevention three sanitary measures are indicated: first, a compulsory report of all cases of tuberculosis, whether in human beings or animals, to the board of health; secondly, a governmental destruction of all infectious material with the necessary disinfection of the surroundings; and, thirdly, the institution of special hospitals for the treatment of tuberculosis. In this paper I will consider the last named only: first, because it is practicable; secondly, because it can be demonstrated to be effective; and, third, because it will enlist the coöperation of those who are as yet not ready to accept the theory of the contagiousness of tuberculosis.

The country in which special hospitals for the treatment of tuberculosis have been given the most extensive trial, at least as far as I have been able to learn, is England. The Englishman, without having any idea that he was instituting a sanitary measure, but purely out of kindness of heart, and from a keen

appreciation of the wants of his sick neighbor, already began his humanitarian work for those afflicted with tuberculosis in the last century. In 1791 the Royal Sea-bathing Infirmary for Scrofula, was founded at Kent County, England. Whilst this hospital never did, and does not now, take consumptive patients, so-called, it nevertheless has been, and is now, a special hospital for tuberculous diseases. It seems to confine itself to those forms of tuberculosis which come under the old term of scrofula. The medical directory of the United Kingdom for 1889 states that the number of in-patients which can be treated in the hospital during a year is 580, and the superintendent, Mr. George H. Chexfield, kindly informs me by post that the capacity of the hospital for in-patients is 220, and that the percentage of recoveries in the hospital for the year 1888 was forty-five per cent.

The next institution that sprang up in England, which approaches anything near to being a special hospital for tuberculous diseases, is the Royal Hospital for the Diseases of the Chest. It was established in London, City Road, E. C., in 1814; was rebuilt in 1863, and enlarged in 1885. In 1878 it could accommodate 165 in-patients yearly, and in 1889 its average had arisen to 305. From the title, I judge that it takes in all kinds of diseases of the chest.[1]

In 1841 the first hospital was instituted in England which had for its object the treatment of persons suffering from consumption. This was the Brompton Hospital for Consumption and Diseases of the Chest. Although instituted in 1841, it was not incorporated until 1850. It is located at Brompton, S. W. London. It averaged 1330 in-patients annually in 1878, and 1784 in 1888. It is incorporated by Act of Parliament, and receives patients from all parts of the kingdom. It is under the immediate patronage of "Her Most Gracious Majesty the Queen," "His Royal Highness the Prince of Wales, K. G.," "Her Royal Highness the Princess of Wales," and has for vice-patron "His Royal Highness the Duke of

[1] Medical Directory of United Kingdom.

Cambridge, K. G." It is strictly a charity institution, and depends for its support upon bequests and contributions. "The government and management of the institution are entrusted to a general court of governors, and a committee of management," and the hospital itself is in the hands of what is called an "Establishment," which consists of a president and vice-president, a chaplain, a treasurer, a secretary, a resident medical officer, a lady superintendent, a collector, consulting physicians, a surgeon, not more than six assistant physicians, a pathologist (and curator of the museum), and a dental surgeon. Every donor of fifty-two pounds and ten shillings, or upwards, at one time, or at different periods within three years, becomes a "governor for life"; and every subscriber of five pounds and five shillings, or upwards, per annum, becomes a "governor." "Every person making a bequest of one hundred pounds, or upwards, to the hospital, may nominate a life governor; and in the event of such nomination not being made, one of the executors mentioned in the will shall be entitled to the privileges of a life governor." "Every governor is entitled to one vote at the courts of governors, and to one additional vote for every additional donation of one hundred pounds, or annual subscription of ten pounds, provided that in no case shall the number of votes acquired by any governor exceed five." "Persons becoming governors by donation or annual subscription are entitled to recommend one in-patient and eight out-patients annually for every donation of fifty-two pounds and ten shillings, or annual subscription of five pounds and five shillings," while "Annual subscribers of less than five pounds and five shillings are entitled to recommend four out-patients for each pound and shilling subscribed." "Every incumbent or other minister who shall permit a collection to be made in his church or chapel for the benefit of the hospital, shall be entitled to the privilege of recommending, for every fifty-two pounds and ten shillings so collected, one in-patient and eight out-patients annually during five years; but in all cases where the collection is less than fifty-two pounds and ten shillings, the incum-

bent or minister shall be entitled to a set of letters for one in-patient and eight out-patients for each sum of ten guineas collected, such sets of letters to be issued for consecutive years. And every clergyman or other minister not being the incumbent, who shall preach for the benefit of the hospital (the sum collected not being less than fifty-two pounds and ten shillings) shall be entitled to the privileges during the year ensuing the day on which the collection was made of recommending one in-patient and four out-patients."[1]

By this excellent system, as briefly outlined by the quotations which I have made from the standing rules, the hospital not only supplies itself with machinery for government and means of subsistence, but justly distributes its patronage among its benefactors.

During the year 1888, £7773 16*s.* were raised by annual subscriptions, £5445 12*s.* by donations, £2595 14*s.* 2*d.* by church collections, and £65,179 12*s.* 11*d.* by legacies. That the money is well expended, and that the institution is well governed, would appear from the fact that during the same year the total expenditure was £30,474 0*s.* 7*d.*, leaving a handsome balance to be added to its funded property. The funded property of the institution was, on December 31, 1888, £130,605 9*s.* 11*d.*[2]

The Brompton Hospital is probably the largest institution of the kind in existence, and consists of a parent hospital and an extension building. The parent building is "built in the shape of the letter H, the depth of each wing being 190 feet, and the width of the building 200 feet. It stands in a square piece of ground covering three acres, and faces the public road. . . . The grounds have been laid out at considerable expense, and are thoroughly drained, so that the broad terrace walks, which they present, become available for the patient very soon after the heaviest rain."[3]

"The ground floor is on a level with the gardens. The

[1] Quotations are from forty-eighth Annual Report of the Hospital for Consumption and Diseases of the Chest, Brompton.

[2] Supra cito.

[3] Supra cito.

west wing contains physicians' rooms, laboratory, museum, rooms for the resident medical officer and clinical assistants, and servants' hall. The warming of the hospital . . . is effected by hot water constantly circulating in large pipes extending throughout the building. The ventilation is obtained by means of extracting-shafts, consisting of two lofty towers, heated with steam, into which the vitiated air is drawn through large ducts leading from all the wards and corridors. There are also fires in all the wards, both on account of their cheering appearance and warmth, and their use as ventilating agents. The kitchen and sculleries abut on the north side of the central basement corridor, and are built outside of the hospital altogether. . . . Immediately adjoining is the boiler house, in which are the two boilers for supplying hot water to the systems of pipes for warming the building. It also contains a powerful steam boiler, which generates steam for heating the extracting-coils in the ventilating towers. This boiler likewise supplies steam to heat the water in the kitchen and the sculleries, lavatories, and baths, as also to grind the coffee, and to raise the lift which takes up the patients' meals hot from the kitchen, as well as other necessaries; also to raise a lift for conveying to and from the galleries those patients for whom exercise in the grounds is desirable. . . . The first floor is devoted exclusively to female patients, saving small rooms for the chaplain and for each of the two head nurses, and the two requisite sculleries, baths, and lavatories. The temperature is the same in the galleries as in the wards; patients are therefore able to read or work in these well-lighted, roomy corridors, without inconvenience or exposure; or, they may walk when the weather will permit of their going out; they are also provided with easy couches and seats and movable tables for meals. . . . The first floor accommodates 103 female patients."[1]

"Second floor.—The arrangements of this floor are precisely the same as those of the first floor, the wards being occupied

[1] Supra cito.

by male patients, for whom there are 107 beds. . . . The breadth of the galleries in both floors is ten feet, and their height and that of the wards is fourteen feet."

"The attic floor has comfortable dormitories for the nurses and servants, and in the tower are the sleeping apartments of the clinical assistants."

"The new extension building . . . has been constructed for 137 additional in-patients, and an extensive out-patient department. It is situated on the south side of Fulham Road, and connected with the parent hospital by a tunnel beneath the roadway. Built of red brick, with terra-cotta and Ancester stone, it takes the form of the letter E, the two wings looking south, the main body of the building facing north; it is 200 feet long and 100 feet high." "The basement contains compressed air and Turkish baths, rooms and stores for steward and housekeeper, etc."[1]

"The ground floor has a central entrance hall, flanked on the east by a large out-patient department ($19\frac{1}{2}$ feet high), and on the west by rooms for the resident staff, a mezzanine for the nurses, and a lecture-room." "The first, second, and third floors are devoted to in-patients, each floor consisting of a corridor (10 feet in width), which runs round to the north and east sides of the building, in the centre of which is a large dining hall, ten wards ($13\frac{1}{2}$ feet high), holding from one to eight beds—forty-six in all; two nurses' rooms, baths and lavatories, and two inhaling rooms. The average floor space per bed is 115 feet, the cubic space being 1400 cubic feet."

"The top floor contains the kitchen, with rooms for night nurses and servants."

"The ventilation is maintained independently of the windows and fire-places, and supplies 4000 cubic feet of air per hour to each patient. The air is admitted by numerous openings, placed on a level with different floors: on the east and north into the galleries, on the west and south into the wards, the greater portion being heated by passing over coils of hot-

[1] Supra cito.

water pipe; part is admitted directly, the quantity of hot and cold air being modified at will, and the temperature capable of being evenly maintained. The vitiated air is drawn off from the corridors, wards, etc., through extracting flues built in the walls, and furnished with openings at floor and ceiling. These flues run into large air-ducts beneath the roof, which communicate with four towers heated by steam coils forming the exhausting chambers."[1]

"Lavatories (twelve) and baths (two) stand on the north of the corridors by themselves, and the slop-sinks (two on each floor) are situated in small annexes." "The flooring is constructed on . . . fire-proof principle, and has a sub-floor of deal, with teak above, which is waxed."

There are two principal staircases of teak in the centre of the building, and two stone staircases in the wings."

"There are three hydraulic lifts: one for passengers, etc., two others, smaller, for food, etc., from the kitchen to the basement."

In connection with the Brompton Hospital, and as an auxiliary to it, there is what is called "The Home," which is an institution maintained by benevolent ladies, for the purpose of giving the poor who are waiting for their turn in the hospital, or who are looking for employment after leaving the hospital, a temporary home. This is located at 27 Smith Street, King's Road, Chelsea. It admits only males.[2]

By the regulations of the hospital, "Persons unable, from necessitous circumstances, to pay for medical advice, are alone eligible for treatment, either as in- or out-patients; and "only those whose cases admit of more or less permanent relief from treatment can be received." A person desiring admission to the hospital must have a letter of recommendation from a governor; must forward a certificate from his medical attendant, setting forth his condition, to the secretary; may have to pass a medical examination before the hospital physician, and if found "eligible," will be "admitted strictly in turn," for

[1] Supra cito. [2] Supra cito.

which he will probably have to wait from two to about eight or ten weeks, according to the number before 'him' on the list. In the meantime, he may attend as an out-patient.[1]

In connection with the hospital there is a fund called the Rose Fund, from which the very poor are furnished with clothing. Donations of clothing are also received from the charitable contributors. The hospital yearly sends a large number of properly selected cases to convalescent homes and seaside resorts at its own expense. During the year 1888, it sent 290 such to the seaside.

Every want and need is supplied to the unfortunate sick, and everything is done to make them happy. "Weekly musical and other entertainments" are given for the enjoyment and benefit of the patients during the winter, and "the more delicate patients," who are unable to take walks, are given "drives in the fine weather."

Of the 1784 patients treated in the hospital during the year 1888, there were discharged during the year "many greatly benefited," 1231, and there died 229. "The average period of residence of each in-patient was 61½ days."[2]

The next hospital, in the order of time, which was established in England for the treatment of persons suffering from consumption, is the Infirmary for Consumption and Diseases of the Chest, at 26 Margate Street, Cavendish Square, W. London. It was instituted in 1847. It is stated in the Medical Directory for the United Kingdom, that 2000 patients are treated in the institution annually; but it is not stated whether they are in- or out-patients.

In 1848, the City of London Hospital for Diseases of the Chest was founded at Victoria Park, E. London, and in 1855 it began to admit in-patients. It is a strictly charity institution, and is maintained and governed in almost the same way as the Brompton Hospital. It is under the patronage of the Royal family and members of the nobility, and has for its supporters prominent Englishmen, both professional and lay. Its average

[1] Supra cito. [2] Supra cito.

in-patient capacity was 781 annually in 1878, and 1073 annually in 1888.[1]

"Annual subscribers of one guinea are governors for the time being, and donors of ten guineas are governors for life." "Donors of thirty guineas are entitled to recommend one in-patient and six out-patients during each year, for life. Donors of ten guineas are entitled to recommend one in-patient during each year, for life. Donors of five guineas are entitled to recommend one in-patient and four out-patients, for one year only. Donors of five guineas and upwards will be further entitled to the privileges of donors of ten and thirty guineas, on increasing their donations to the above amounts." "Annual subscribers of three guineas are entitled to recommend one in-patient and four out-patients. Annual subscribers of one guinea to recommend four out-patients. Donations and subscriptions paid by firms, companies, or societies, confer the above privileges upon one named member only."[2]

Similar provisions to those of the Brompton Hospital are made in favor of those who leave bequests, and of ministers who allow collections to be taken up in their churches, or who preach for the Hospital. The privileges, however, are graded by the standard of thirty guineas, as set forth above.[3]

The method of governing and conducting the institution, and the regulations as to admission of patients, are so similar to those of the Brompton that it would be repetition to set them down.

The receipts of the hospital for the year 1888 were: donations, £2437 3*s.* 2*d.*; annual subscriptions, £2488 4*s.* 8*d.*; bequests, £4626 8*s.* 7*d.*; dividends, £404 9*s.* 7*d.*; Hospital Sunday Fund, £866 13*s.* 6*d.*; Hospital Saturday Fund, £263; church and church parade collections, £99 17*s.* 11*d.*; incidental receipts, £165 9*s.* 9*d.*; making a total income of £11,351 7*s.* 2*d.* The expenditures for the year were £10,199 5*s.* 1*d.*

Of the 972 patients admitted during the year 1888, 877 were

[1] Forty-first Annual Report of the City of London Hospital for Diseases of the Chest, Victoria Park.

[2] Supra cito.

[3] Supra cito.

more or less relieved, and 95 died. From the time that patients were first admitted to the hospital in 1855, to December 31, 1888, there were admitted into the institution, 22,360 patients.. So great is the demand for admission that patients have to await their turn at all times.

In 1850, the Western Hospital for Incipient Consumption was established at Torquay, Devonshire County, England. Its average annual in-patient capacity is 40.[1]

In 1855, the National Sanitarium for Consumption and Diseases of the Chest was founded at Bournemouth, Hampshire County, England. In 1878 it could accommodate 248 in-patients annually, and in 1888 its capacity was 286.[2]

In 1860, the North London Hospital for Consumption was established at 216 Tottenham Court Road, W. London. It could accommodate 228 in-patients annually in 1878, and 320 in 1888.[3]

In 1864, the Liverpool Hospital for Consumption and Diseases of the Chest was founded in Liverpool, Lancashire County, England. Its annual in-patient capacity in 1888 was 180.[4]

In 1857, the Alexander Hospital, for children with hip-disease, was established at 18 Queen Square, Bloomsbury, W. C. In 1888 its annual in-patient capacity was 145.[5]

In 1868, Fir's Home for Advanced Consumption was founded at Bournemouth, Hampshire County, England. Its annual in-patient capacity in 1888 was 55.[6]

In 1869, the Royal National Hospital for Consumption and Diseases of the Chest was founded at Ventnor Undercliff, in the Isle of Wight. Like the Brompton and the City of London, it is under the patronage of the Royal family, and counts among its promotors many of the most prominent men in England. Whilst it is governed and managed much in the same manner as the two afore-mentioned institutions, it is not entirely a charity hospital. It, moreover, differs from the

[1] Medical Directory of the United Kingdom.
[2] Supra cito. [3] Supra cito. [4] Supra cito.
[5] Supra cito. [6] Supra cito.

former in being conducted on what is called the separate principle—that is, placing each patient in a room by himself.[1]

"£31 10*s.* (paid either in one sum, or by instalments within three years) constitutes the donor a life governor;" "£10 10*s.* constitutes the donor a governor for one year, with the privilege of recommending one patient;" "£3 3*s.* annual subscription constitues an annual governor, with the privilege of recommending one patient every year;" "£2 2*s.* annual subscription entitles the subscriber to recommend one patient every second year;" "£1 1*s.* annual subscription entitles the subscriber to recommend one patient every third year." "Every clergyman or minister collecting £10 10*s.* in his church or chapel, for the hospital, will become a governor for one year, with the privilege of recommending one patient." "Donors of £350, or subscribers of £35 annually, are entitled always to have one patient in the hospital." The first-named executor acting under a will by which a legacy of not less than £100 is left to the hospital, and collectors of not less than 10 guineas are eligible to governorships by the Board[2].

The Royal National Hospital consists of twenty houses joined together in ten blocks. It is beautifully situated on a tract of land twenty-two acres in extent, and enjoys both a country and ocean climate. Sixteen of the houses were built at the expense of private individuals, and bear their names. Everything about the institution, both as to its construction and its management, is in accordance with modern views of hygiene and physical comfort. It can accommodate 140 patients at one time, and, from the time of its foundation to the present, has extended its aid to nearly 9000 in-patients[3].

During the year 1888, the hospital received: By annual subscriptions, £1687; by donations, £2181; by Hospital Sunday and Saturday Funds, £318; by church collections, £35; by legacies, £252; by patients' payments, £2893; by interest and dividends, £1493; by sundry receipts, £54; in all, £8913.

[1] The Royal National Hospital for Consumption and Diseases of the Chest, on the Separate Principle, Ventnor Undercliff, Isle of Wight, 1888.

[2] Supra cito.

[3] Supra cito.

During the same year the expenditures were £9280, a trifle above the income. The hospital owns funded property to the value of upward of thirty thousand pounds.[1]

The regulations bearing upon the admission of patients are much the same as those of the Brompton and the City of London Hospitals. "Applicants without distinction of creed or sect, from all parts of the United Kingdom," are admitted, but a payment of 10*s.* per week is required of them to help defray the expense of maintenance. That this small fee does not interfere with filling the hospital would appear from the fact that at times there are "upward of fifty applicants waiting their turns of admission."[2]

During the year 1888, there were 735 patients under treatment in the hospital, of which 603 completed their terms of residence during the year. Of these 603, 64 left very much improved, 94 left much improved, 221 left improved, 109 left *in statu quo*, 82 left in worse condition than they entered, and 33 died during the year. Of the improved patients, 29 gained over fourteen pounds each during their stay.[3]

In 1872 the Hospital for Children with Hip-diseases was established at Sevenoaks, Kent County, England. It averages 27 in-patients a year.[4]

In 1875 the Manchester Hospital for Consumption and Diseases of the Chest was founded at Deargate, Hardman Street, Manchester, England. Its average annual number of in-patients, in 1888, was 128.[5]

During the same year, 1875, the Belfast Royal Hospital, at Belfast, Ireland, opened a consumption department. What number of in-patients it can accommodate, I have been unable to learn.[6]

In 1878, the "Northern Counties Hospital for Diseases of the Chest" was opened at Newcastle-upon-Tyne, in Northumberland County, England. Its annual average number of patients is 30.[7]

[1] Supra cito.
[2] Supra cito.
[3] Supra cito.
[4] Medical Directory of United Kingdom.
[5] Supra cito.
[6] Medical Directory of United Kingdom.
[7] Supra cito.

In 1880, the "Belfast Hospital for Consumption and Diseases of the Throat" was established in Belfast. In 1888, its annual average number of patients was 820.[1]

In 1884, the "St. Leonard's Hospital for Diseases of the Chest and Throat" was founded at St. Leonard's, Sussex County, England. Its annual average number of in-patients in 1888 was 167.[2]

As far as I have been able to learn, the United Kingdom of Great Britain has at present eighteen hospitals which are, in a certain sense, special hospitals for the treatment of tuberculous diseases, and which in the aggregate can accommodate between six and seven thousand in-patients annually. Of the eighteen, only three are exclusively for tuberculous diseases, namely, the North London Hospital for Consumption, the Western Hospital for Incipient Consumption, and Fir's Home for Advanced Consumption.

Another country in which consumption hospitals have been in operation on a somewhat extensive scale is Germany. In 1857, Dr. Herman Brehmer published some original observations, under the title of "Chronic Pulmonary Consumption and Tuberculosis of the Lungs, its Cause and Cure," which, having attracted the attention of Alexander von Humboldt, obtained for him, through the latter, government permission to establish his now celebrated sanatarium for consumptives at Görbersdorf, a small village "on the floor of a sinuous valley in the mountainous region of Waldenburg, in Silesia. The first building, a modest cottage, was put up in 1859;[3] but it was soon too small, and in 1862 a larger and more pretentious one was erected. So well did Dr. Brehmer's undertaking prosper that he now owns an estate of "270 acres, of which no less than 70 acres are cultivated woodland, available for promenades," on which he has erected most stately, magnificent buildings, capable of accommodating over two hundred patients in separate rooms.

[1] Supra cito. [2] Supra cito.

[3] In the hospital's advertisement in Preussischer medicinal Kalendar, it is stated that the hospital was founded in 1854.

Everything about Dr. Brehmer's sanatarium, either in the buildings or about the grounds, is arranged scientifically for the benefit of the patients. A large dairy is kept on the farm, from which a plentiful supply of fresh milk is to be had at all times. The patients are constantly under the care of a physician, and eat, sleep, and exercise in accordance with his directions. "The minimum charge for board and lodging, including baths, etc., is 36 marks (£1 16*s.*), and, whilst higher prices are charged, according to the room (the maximum being 60 marks), there is no difference in the dietary. Patients are attracted to the institution from all parts of the world, and a respectable number come from America.

In connection with the institution there are a chemical and bacteriological laboratory, and a meteorological observatory. Every patient is individually studied with a view of restoring him to health, and all his thoughts, movements, and actions are directed to that end. As co-laborers, Dr. Brehmer has five assistants.[1]

In 1874, a sanatarium for the treatment of consumptives was established at Falkenstein, "on the southern slope of the Taunus mountains, about fourteen hundred feet above sea-level, near the city of Cronberg," and "about two hours' ride by rail and stage from Frankfort." "It consists at present of three large buildings, together with such necessary annexes as gas-works, cow-stables, laundry, etc. The largest of the three buildings presents the form of a horseshoe, to protect the inhabitants from the rather heavy north winds which prevail there occasionally, and contains eighty rooms, with over one hundred beds, and post and telegraph offices, parlors, reading-rooms, billiard-room, offices, examination-room and the douche in the basement. The next building, connected with the others by an arcade, contains the large, high, and well-ventilated dining-room, which seats about two hundred people comfortably, the kitchen being outside of the building. The third

[1] Illustrated Europe. Nos. 29, 30. Görbersdorf, etc. Z. R. Artman.

building contains the residences of the medical superintendent and his associates."[1]

The institution was founded by a stock company, the shareholders of which are "not to receive more than five per cent. dividend on their investment. The surplus income is to be used for the improvement of the institution, and later on for the establishment of similar places for the treatment of the poorer classes." Its medical direction and management are in the hands of Drs. Dettweiler and Meissen, the former of whom was at one time a patient and pupil of Dr. Brehmer.[2]

In 1875, Dr. Theodore Roempler started a private hospital for diseases of the lungs, throat, nose, and ears, at Görbersdorf, Silesia. It at present consists of a main building and two cottages, with necessary annexes, douche and bath-rooms, and an extensive winter garden. Although in close proximity to Dr. Brehmer's institution, it seems to have been well patronized, and is reported to be in a flourishing condition.[3]

Within the last few years, quite a number of private institutions for the treatment of consumption and diseases of the chest and throat have sprung up in various parts of the German empire. As among the former may be mentioned that of Dr. Hirsh, at Falkenstein; that of Dr. Watzka, at Geltschberg, in Bohemia; that of Dr. Dietz, at Kissingen, in Bavaria; that of Dr. E. Kaatzer, at Rehburg, in Hanover; that of Dr. Driver, at Reiboldsgruen, in Saxony, and that of Dr. Schreiber, at Aussee. Among the latter may be named Dr. Pintschovius's institution for the treatment of asthma, at Altenbrak; Dr. Schliep's hospital for diseases of the chest, at Baden-Baden, in Baden, at the foot of the Black Forest (Pneumo-therapie Institut); Dr. Kollman's chest and throat hospital, at Badenweiler, in Baden; Dr. Friedman's sanataria for diseases of the chest, at Blankenheim and at Berka, in Thüringen; Dr. Speck's hospital (Pneumo-therap. Inst.), at Dillenburg; Dr. Huber's hospital (Pneumo-therap. Inst.), at Meran, in South

[1] Dr. Dettweiler's Method of Treating Pulmonary Consumption. By Paul H. Kretzschmar, M.D. Pages 11, 12.

[2] Supra cito.

[3] Preussischer medicinal Kalendar, 1890.

Tyrol; Dr. Haufe's chest hospital, at St. Blasien, in the Black Forest; Dr. Wehner's hospital (Pneumo-therap. Inst.), at Brueckenau, in Bavaria; Dr. Levenstein and Dr. Jastrowitz's institutions at Schoeneberg, near Berlin; Dr. Wunderlich's institution (Pneumatic Cabinet), at Schoeneck, in Switzerland; Drs. Andressen and Henning's hospital at Sophienbad, near Hamburg,[1] and Dr. Jacubasch's hospital at St. Andreasburg, in the Hartz mountains.[2]

In addition to these, there are a few institutions which seem to be partly under the control of the government, namely, the consumption hospital at Inselbad, near Paderborn; the consumption hospital at Reichenhall, near the Austria-Bavarian boundaries, and the chest hospital (Pheumo-therapie Institut), at Ems, in the Taunus mountains. At Frankenhausen, in the Black Forest, there is a hospital for scrofulous children, under the direction of Dr. Hesse.[3]

In 1880, a number of French gentlemen founded a hospital for the gratuitous treatment of children suffering from tuberculosis in Villepinte, France. This institution has at present over two hundred beds. More recently a similar hospital has been established at Aemesson for boys. The subject of special hospitals for tuberculosis will probably receive considerable attention in France in the near future, as there is an association in existence to further the work.[4]

The question of establishing special hospitals for the treatment of tuberculosis has, so far, attracted but little attention in America. In 1884, the Adirondack Cottage Sanatarium of New York was started, through the instrumentality of Drs. A. L. Loomis and E. L. Trudeau, and by the benevolence of some New York ladies and gentlemen. It is built on the cottage plan, and at present consists of eleven cottages, and can accommodate fifty patients. "The location . . . . is a very pleasant one, about 1750 feet above tide-water, covering an

[1] All of the foregoing quoted from Preussische medicinal Kalendar.

[2] Dr. Dettweiler's Method of Treating Pulmonary Consumption. Kretzschmar.

[3] Preussische medicinal Kalendar.

[4] The Medical and Surgical Reporter, vol. lxii. p. 89.

area of over eight acres, about one mile from Saranac Lake, and seven miles from Paul Smith's," in the Adirondacks. It is conducted in accordance with all modern knowledge of the etiology and therapeutics of tuberculosis. It is a semi-charity institution, and gets its support from voluntary contributions and from moderate fees ($5.00 per week) from patients.[1]

From 1884 to February, 1889, the voluntary contributions amounted to $29,565.50, and the fees from patients to $18,515.28; total, $48,080.78. The expenditures for the same time, for land, buildings, permanent investments, board of patients and current expenses, amounted to $45,707.66. "Up to the end of 1888, 146 consumptive patients have been treated" at the hospital; and, of these, "4, or not quite 3 per cent.," died; "25, or about 17 per cent.," steadily failed; "38, or about 26 per cent.," remained stationary or were slightly benefited; "63, or 43 per cent.," had the disease "arrested;" and "16, or 11 per cent.," were cured.[2]

In 1887, the Philadelphia Protestant Episcopal Mission established a hospital for the treatment of consumption, at Chestnut Hill. The plan of the institution contemplates a main building and several cottages, but as yet only the main building and one cottage have been built. It is beautifully situated and well constructed, and, when completed, will be a most excellent hospital. It is well patronized, and can at present accommodate about fifty patients annually. It is a charity institution.[3]

In 1888, Dr. Carl von Ruck established a private sanatarium, at Asheville, N. C., which he named the Winyah Sanatarium. It is located just outside of Asheville, and is surrounded by a fine cultivated park, and is in close proximity to pine forests. It is conducted in accordance with modern ideas of hygiene and physical comfort, and is equipped with all modern facilities for the treatment of diseases of the throat and lungs. The

[1] Institutions for the Treatment of Pulmonary Consumption in the United States. Dr. Paul H. Kretzschmar.

[2] Supra cito.

[3] Report of Philadelphia Protestant Episcopal Mission.

rates for room and board are from ten to twelve dollars per week; and, in addition, there is a professional fee charged of twenty-five dollars per month. "From October, 1888, to the end of May, 1889, there were fifty-one patients" treated in the institution.[1]

At the present time, there are a number of sanataria for the treatment of consumption in course of erection in Colorado and New Mexico. The Bellevue Sanatarium, of Colorado, will be thrown open some time this month. It will consist of a main building and a number of cottages. The main building is about being completed at a cost of thirteen thousand dollars, and contains dining-room, parlor, bath-rooms, etc., and bed-rooms for fifteen patients. The cottages will have a capacity of four or five patients apiece.[2]

The institution is beautifully located out of town, and will be well equipped for the work for which it is designed. It is intended mainly for professional people of moderate circumstances, and the charges for room and board will be regulated by the ability of the patient to pay. There will, probably, be a few free beds.[3]

The Gleckner Sanatarium, of Colorado, is likewise about being completed at a cost of thirty-five thousand dollars. It will be able to accommodate about thirty patients. It will be a semi-charity institution, the charges being very low, and it will likely have a considerable number of free beds.[4]

There are, no doubt, other special hospitals for the treatment of tuberculosis in existence, concerning which I have not been able to get any information.

If the theory that tuberculosis is a contagious disease is correct, countries in which special hospitals for the treatment of tuberculosis have existed should show a decrease in the mortality from the disease; because each case that is removed to a hospital takes away from the community a centre of infec-

[1] Dr. Kretzschmar's article l. c. and circular of information about the Winyah House.

[2] Information kindly furnished me by Dr. S. E. Solly, Colorado Springs.

[3] Supra cito.

[4] Supra cito.

tion. Now, has any country given consumption hospitals a long enough and extensive enough trial to justify the testing of this hypothesis? England, undoubtedly, has, and it is probably the only country that has.

In England special hospitals for the treatment of tuberculosis have flourished for upward of forty years, and, during all that time, their isolating capacity has ranged from about two thousand to about eight thousand cases a year, or, in other words, from about three per cent. to about eighteen per cent. of all cases. The patients have, moreover, been taken from among the poor, who are always surrounded by the most favorable circumstances and are the fittest subjects for spreading contagious diseases.

In Germany there likewise exist a large number of special hospitals for the treatment of tuberculosis, but nearly all of them are of recent origin. Beside, they are all pay institutions, and take their patients from the wealthier classes. It will, therefore, be much more difficult to study and calculate the prophylactic influence of isolation in Germany than in England; and the former country can scarcely be looked upon as a fair field wherein to test the hypothesis which I have laid down.

Has tuberculosis decreased in England since special hospitals for its treatment have been introduced? A statistical study of the disease in England, during the last forty years, will best answer that question.

Official registration of deaths was begun in England in 1837.[1] At that time, there were already two special hospitals for the treatment of tuberculosis in England, and between that time and 1848 three more were instituted. The capacity for isolation of the special hospitals, during the ten years intervening, ranged between two and three thousand cases; and the reduction in the mortality of deaths registered under the heading of consumption was over twenty per cent. In studying the influence of isolation upon the disease, I ought, therefore, strictly

[1] Registrar-General's Report.

speaking, to begin my statistical computation from 1838, and, did I do so, my results, as far as consumption is concerned at least, would be much more striking; but, on account of the newness of the registration law and the unsettled, indefinite nomenclature in vogue at the time, I prefer to begin with 1848, when sufficient time had elapsed to allow registration to become understood and get well under way.

In order to present the subject more clearly, and to enable every one to test for himself the correctness of my conclusions, I have prepared some tables which I will designate Table I., Table II., and Table III.

Table I. gives the population, the general mortality, and the mortality from tuberculous diseases and all diseases that have any symptoms in common with tuberculosis, or that could in any way be mistaken for it, or returned under any of its forms, of England and Wales, for the years 1848 to 1888, inclusive; and likewise gives the aggregate mortality from acceptedly tuberculous diseases, probably tuberculous diseases, and possibly tuberculous diseases for the same years.

Table II. gives the rate of mortality, per thousand persons living, from consumption in various large cities, and in England and Germany, from 1864 to 1888, for such years as I was able to obtain it. This table, unfortunately, has to remain incomplete, on account of the difficulty of getting at statistics.

Table III. gives a list of the special hospitals for the treatment of tuberculosis in the British kingdom, together with their in-patient capacity at different epochs.

For the sake of convenience I have divided tuberculous diseases, and all diseases which have any symptoms in common with tuberculosis, into acceptedly tuberculous diseases, probably tuberculous diseases, and possibly tuberculous diseases.

As acceptedly tuberculous diseases, I class phthisis, tabes mesenterica, hydrocephalus, and scrofula; as probably tuberculous, by which I mean such diseases as are probably tuberculous, but are returned under a non-tuberculous nomenclature, I set down asthma, ulceration of the intestinal canal, cephalitis, laryngitis, diseases of the lungs without name, diseases of the

brain without name, diseases of the intestines without name, and hemorrhage of uncertain seat; and, as possibly tuberculous, by which I mean such diseases as have any symptoms in common with tuberculosis, or could be mistaken for it, I put down bronchitis, pneumonia, pleurisy, influenza, whooping-cough, convulsions, teething, gastritis, enteritis, peritonitis, dyspepsia, debility, atrophy, inanition, ague, remittent fever, typhus fever, enteric fever, simple fever, diarrhœa, dysentery, abscess of uncertain seat, causes of death not specified or ill-defined, and premature birth, the latter being included because, during part of the time, it is returned in common with debility. The group of possibly tuberculous diseases has purposely been made wide-reaching, so that it might contain every possible case of tuberculosis that occurred in England and Wales during the forty years under consideration.

In 1848, the mortality in England and Wales, from all diseases, was 22.97 per thousand living, or one person dying to every 43.52 persons alive; from consumption, 2.97 per thousand living, or one person dying to every 335.646 persons alive; from acceptedly tuberculous diseases, 3.807 per thousand living, or one person dying to every 262.635 persons alive; from probably tuberculous diseases, 0.974 per thousand living, or one person dying to every 1026.003 persons alive; and from possibly tuberculous diseases, 9.502 per thousand living, or one person dying to every 105.236 persons alive; whilst, in 1888, the mortality in England and Wales was: from all diseases, 17.85 per thousand living, or one person dying to every 56.028 persons alive; from consumption, 1.545 per thousand living, or one person dying to every 647.007 persons alive; from acceptedly tuberculous diseases, 2.189 per thousand living, or one person dying to every 456.731 persons alive; from probably tuberculous diseases, 0.808 per thousand living, or one person dying to every 1236.447 persons alive; from possibly tuberculous diseases, 6.783 per thousand living, or one person dying to every 147.426 persons alive.

Thus it will be seen that the reduction in the mortality in England and Wales, during the forty years from 1848 to 1888,

is, from all diseases, 5.12 per thousand, or about twenty-five per cent. of the total mortality; from consumption, 1.425 per thousand, or nearly fifty per cent. of the mortality from consumption; and from acceptedly tuberculous diseases, probably tuberculous diseases, and possibly tuberculous diseases combined, 4.513 per thousand, or nearly thirty per cent. of the combined mortality from those causes.

If now the sum of the reduction in the mortality from acceptedly tuberculous diseases, probably tuberculous diseases, and possibly tuberculous diseases be subtracted from the reduction in the entire mortality in England and Wales, during the forty years intervening between 1848 and 1888, we have a reduction of 1.607 per thousand living in the mortality from those diseases which have no symptoms in common with tuberculosis, which is a reduction of only about ten per cent. in the mortality from those diseases.

A very misleading factor in the mortality returns of England is the rapid increase in the death-rate from bronchitis during the first forty years of registration. The most natural inference, and the one that has been drawn by most writers, is, that there has been a transposition of nomenclature from consumption to bronchitis—that is, that diseases which were formerly returned under the heading of consumption were, later on, returned under that of bronchitis. This conclusion, in addition to being the easiest arrived at, was given considerable support by the fact that, whilst the returns were showing a decrease in the mortality from consumption, they were showing an increase in the mortality from diseases of the respiratory system. The inference is, however, entirely wrong, and will not be borne out by a careful scrutiny of the facts.

I have, myself, no doubt that there was some transposition of nomenclature from consumption to bronchitis, during the first ten or fifteen years of registration, for in no other way can the abrupt decrease in the mortality from consumption, and the abrupt increase in the mortality from bronchitis, during the first few years of registration, be explained, and it is, moreover, well known that during the early part of the

present century, deaths due to diseases of the respiratory system were mostly ascribed to either consumption or pneumonia. This, however, holds good for the first few years of registration only, for, later on, the decrease in the mortality from consumption becomes quite gradual and steady, and the increase in the mortality from bronchitis can be no longer explained upon the theory of transposition, but can be satisfactorily explained in another way. Indeed, it is quite probable that during recent years, with the new methods of diagnosis, there has been a re-transposition of nomenclature from bronchitis to consumption.

A careful study of Table I. will give the real source of increase to the mortality returns from bronchitis. It will be seen that, as the number of deaths returned under the heading of bronchitis increases, the number returned under those of influenza, convulsions, debility, and atrophy, and the number of undiagnosed diseases, decreases. Influenza almost entirely disappears from the English nomenclature in later years, but its presence can easily be traced in the up and down curve of the mortality from bronchitis. The largest increase to the mortality from bronchitis, however, comes from convulsions and debility. Newsholme and Farr have called attention to the fact that the increase in the mortality from bronchitis takes place almost entirely under the age of five, and above that of sixty-five years. Now, consumption is an infrequent disease in childhood and old age, whilst bronchitis is a very frequent one; and convulsions are a frequent symptom in bronchitis in children when the disease terminates fatally; and debility is almost a constant concomitant of bronchitis in old age. When, therefore, the medical profession became more precise in diagnosis, and began to give the name of the disease instead of the name of a single symptom as the cause of death, a transposition of nomenclature took place from convulsions and debility to bronchitis. Atrophy and undiagnosed diseases undoubtedly represent the returns of quacks and laymen, and, under pressure from the Registrar-General's office for more accurate diagnosis, would naturally go to swell the returns

from bronchitis, consumption, and such symptomatic nomenclatures as convulsions and debility.

A careful study of the mortality returns of England for the last forty years (not in part, but as a whole) warrants the conclusions, *first*, that there has been a reduction in the mortality from tuberculosis during that time of at least fifty per cent.; and, *second*, that whatever reduction there has been in the general mortality has been largely due to the reduction in the mortality from tuberculosis. It is true that other acceptedly tuberculous diseases do not show as large a reduction as consumption, and that the combined reduction of the acceptedly tuberculous diseases is not much above forty per cent.; but this is undoubtedly due to transposition of nomenclature. The mortality from tabes mesenterica, for example, is constantly being added to by accessions from "ulceration of the intestinal canal," and "diseases of the intestinal canal without name," the mortality from both of which nomenclatures is constantly decreasing.

That the mortality from tuberculosis has been decreased in England by one-half during the last forty years, cannot be doubted by the candid inquirer. Now, is that reduction due to the existence of special hospitals for the treatment of the disease? Whilst this question cannot be positively answered in the affirmative, there are many facts to warrant such an answer.

In the first place, there is no other cause to ascribe the reduction to. Of course, it will be said that the sanitary conditions of England have improved, and that the decrease is due to that cause. But why have not deaths due to other diseases decreased in like ratio? And why have not other countries, that have equally improved in sanitary conditions, had the same reduction in the mortality from tuberculosis? In America, for example, there has been an increase in deaths from tuberculosis during the same epoch. In the United States, the mortality from consumption in 1850 was 1.44 per 1000 living, or one person dying to every 692 persons alive; and in 1880 it was 1.84 per 1000 living, or one person dying

to every 542.34 persons alive—an increase of nearly twenty per cent. The census of 1890 will probably show a still greater increase, for fragmentary reports of various States and cities seem to indicate that consumption is on the increase in the Western and Southern States, and in country districts, and is but slightly on the decrease in the Eastern States and large cities. Paris, one of the most progressive cities in the world in sanitary matters, has a higher mortality from tuberculosis than it had twenty years ago.

*Secondly.*—No marked reduction in the mortality from tuberculosis has occurred in any country where special hospitals for the treatment of the disease have not existed. Table II., although very incomplete, shows quite satisfactorily that the mortality from tuberculosis in continental European countries has but slightly diminished, and in some places has increased.[1] There has been a decrease in some of the German cities, notably in Cologne and Breslau. Some of this reduction has no doubt been due to a transposition of nomenclature; but in Breslau, at least, all of it cannot be accounted for in that way. The mortality from consumption in Breslau was 4.52 per 1000 in 1864, 2.33 per 1000 in 1881, and 3.59 per 1000 in 1882. Prior to 1882, many cases of consumption were returned under the heading of lung disease, which, in 1882, reverted to the nomenclature of consumption, and put it up from 2.33 per 1000 to 3.58 per 1000. But, even with this accession, there is a reduction of at least 20 per cent. between 1864 and 1882. As Breslau is quite near Dr. Brehmer's Consumption Hospital, at Goerbersdorf, its unique position among German cities, in the matter of reduced mortality from tuberculosis is, to say the least, a striking coincidence.

*Thirdly.*—The reduction in the mortality from tuberculosis in England is in direct ratio to the increase in the special hospitals for its treatment. Table III. shows that the nearer we approach to the present time, the greater become the number

[1] In Italy and the Netherlands there has been some reduction.

and capacity of the hospitals, and the more rapid becomes the reduction in the mortality from tuberculosis.

The relation between cause and effect is not always easily made out; but where there is an effect for which there is but one plausible cause, and that cause is consistent with reason, it is fair to assume that it is the cause. The existence of special hospitals for the treatment of tuberculosis is the only discoverable cause for the reduction in the mortality from that disease in England; it is a reasonable cause, and, admitting the contagiousness of the disease, it is the very cause we would expect to produce such an effect; may we not, then, assume that it is the cause, and that the reduction in the mortality from tuberculosis in England *has been due* to the existence of special hospitals for its treatment?

England established its special hospitals for the treatment of tuberculosis from purely humanitarian motives, at a time when knowledge about the disease warranted no other. Since then, the progressive march of scientific medicine has unearthed facts which reinforce the appeals of charity by the world-moving power of personal interest. The question of establishing special hospitals for the treatment of tuberculosis is no longer a question of helping your neighbor alone; it is a question of helping yourself—of protecting yourself and your family (those near and dear to you) against a most loathsome disease, which is almost certainly fatal, and your chances of contracting which are one in seven.

The same state of affairs which appealed to the charity of England forty years ago has existed, and does exist here now, and appeals equally strongly; but the appeal has, so far, failed to spur us on to practical alleviation of the consumptive poor. We have hospital provision for every form of human misery and suffering, except that which appears under the garb of the hectic flush and the racking cough. Why have we none for this? Is it because the American who falls a victim to this dread disease does not want hospital aid? His frequent applications for admission to our general hospitals, where he is either denied entrance, or, if admitted, is simply given quar-

ters to die in, most emphatically negative this. No; he wants hospital treatment; his poverty, his helplessness, his utter despair of recovery, if left to his own resources, and his serious interference with the efforts of his poor relatives to support themselves and him, make him want it. He has wanted it for years; but his misery and his heart-rending despair have plead with us in vain. As a people, we seem to have formed the impression that consumption is an incurable disease, and that because the consumptive must die, we might as well abandon him to his fate. Our sympathies go out strongly to every form of suffering that is brief; but our hearts are hard as stone toward that which is long drawn out. But, whatever influences have shaped the destiny of our charities in the past, our position in this matter has certainly been illogical and inhuman. Of all human beings who are afflicted by disease, the consumptive should stand head in the line of our beneficiaries. Because he has been attacked by a disease which has for ages baffled the skill of even the best trained minds in medical science, is certainly no reason why he should be left untouched by the hand of charity, and uncheered by the balm of hope. Even if it were true that nothing can be done for him, it would certainly comfort him very much to have some one try. But it is not true. Much can be done for tuberculous patients, even in the way of cure, if the proper treatment can be instituted. The experience of all consumption hospitals proves this. But the treatment must necessarily be hospital treatment, for under no other circumstances can the physician have such control of his patient as is necessary for the cure of consumption. What hospital treatment can do for consumptive patients, even when the disease is far advanced, will appear from the report of Dr. Meissen, one of the physicians to Dr. Dettweiler's sanitarium in Falkenstein.[1] "The 731 cases," he says, "were taken without selection from the records of the institution. They comprise 105 cases of initial pulmonary

[1] Dr. Dettweiler's Method of Treating Pulmonary Consumption. By Dr. Paul Kretzschmar. Page 7.

phthisis, 442 cases of active pulmonary phthisis, 125 cases of progressive pulmonary phthisis, 6 cases of florid phthisis, 52 cases of stationary pulmonary phthisis; and of these, 483 patients were benefited by treatment, and 248 died, or did not improve. As we can hope for successful treatment in initial, active, and stationary cases only, the others—florid and progressive phthisis—ought to be excluded from the list, and it would then appear that of 600 patients with pulmonary phthisis, 483 were improved, and 117 were not benefited by treatment; and, while of all the patients 66 per cent. improved and 33 per cent. did not, of those available for treatment, 81.5 per cent. improved, and 18.5 per cent. did not. . . . By improved I mean not only a temporary disappearance of one or more unpleasant symptoms of the disease, or a slight improvement in the physical signs, but a decided and lasting gain in every particular, more especially an increase in the weight and in the strength of the patient, a stronger heart's action, and an increased capacity of the lungs, such as a careful and painstaking physician can observe during the duration of treatment."

If neither the pitiful, helpless condition of the consumptive poor, nor their prospective restoration to health will induce us to establish special hospitals for their treatment, we can find more forcible incentives in our concern for self-preservation. That tuberculosis is a contagious disease and consequently a preventable one, has been demonstrated both experimentally and clinically; and that the institution of special hospitals for its treatment is a humane, effective, prophylactic measure against it, is as evident, from the history of the disease in England during the last forty years, as any fact can be made by mathematical demonstration. We know now that the contagion of tuberculosis resides in the sputa or pus given off from the seat of tubercular inflammation, and we know that it resides nowhere else. The question of preventing the disease, therefore, resolves itself into preventing this sputa or pus from contaminating the healthy. This cannot be done at once, nor by force, as was attempted in Italy and Spain a

hundred years ago, but gradually, and through the medium of education. The only step, indeed, which is practicable, at the present time, is the institution of special hospitals for the treatment of the disease. Such hospitals would not only prevent the sick from infecting the well in the community, but would become, through their patients, bureaus of information in the methods of disinfection to the public at large. They would, moreover, put a stop to the fashionable practice of sending consumptives broadcast over the world, ostensibly in pursuit of the alluring marshlight, climatic cure of phthisis, but, in reality, as propagators of the disease in unaffected districts. The benefits which climate can give need not be denied the unfortunate victim of tuberculosis, but can be given him in such a way as will prevent him from injuring others—namely, in special hospitals for his treatment. Already the Meccæ of the phthisical have taken the cue, and are erecting special hospitals for the benefit of their patrons; but such institutions are only for the wealthy, and will exercise but little influence as prophylactic agents. What we want is large, commodious, well-equipped special charity, or semi-charity hospitals for the treatment of tuberculous diseases in convenient proximity to our large cities, and the sufficient in-patient capacity to accommodate all who may apply for admission. In this way, and in this way only, can we take the first step toward the prevention of tuberculosis. The duty of taking this step rests not alone on the individual, but also upon the government. As the custodian of the public weal, the State owes its citizens as much protection against preventable disease as against a foreign foe. Pennsylvania has always been a liberal contributor to the support of hospitals which have for their object the alleviation of the poor. That it has never done anything for the consumptive poor is probably due to the fact that it has never been asked to do so. May not the medical profession have been lagging in its duty to the public in this matter by not calling attention to the question? Whatever excuse we may have had for silence in the past, modern

## Table No. I.*

(For explanation see page 58.)

| England and Wales. | 1848 | 1849 | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population. | 17,340,492 | 17,520,020 | 17,773,324 | 17,982,849 | 18,255,629 | 18,403,313 | 18,618,760 | 18,786,914 | 19,045,187 | 19,304,897 | 19,523,103 | 19,746,000 | 19,902,918 | 20,119,496 |
| 1 Total nnmber of deaths | 398,385 | 440,839 | 368,995 | 395,396 | 407,135 | 421.097 | 437,905 | 425,703 | 390,506 | 419,815 | 449,656 | 440,781 | 422,721 | 435,114 |
| 2 Phthisis—consumption | 51,663 | 50,299 | 46,618 | 49,166 | 50,594 | 54,918 | 51,284 | 52,290 | 48,950 | 50,106 | 50,442 | 50,149 | 51,024 | 51,931 |
| 3 Bronchitis | 14,472 | 14,826 | 14,611 | 16,294 | 17,073 | 22,391 | 20,062 | 27,182 | 21,528 | 25,588 | 29,093 | 25,998 | 32,347 | 30,986 |
| 4 Pneumonia | 21.862 | 21,194 | 20,303 | 22,001 | 21,421 | 24,098 | 23,523 | 26,052 | 22,653 | 23,457 | 26,486 | 24,514 | 25,264 | 22,914 |
| 5 Asthma | 3,920 | 4,104 | 4,574 | 4,896 | 4,309 | 5,143 | 4,371 | 5,454 | 4,103 | 4,339 | 4,513 | 4,224 | 4,325 | 3,892 |
| 6 Pleurisy | 1,029 | 956 | 877 | 984 | 945 | 855 | 955 | 1,153 | 886 | 870 | 846 | 916 | 882 | 781 |
| 7 Lungs, etc., diseases of | 2,645 | 2,604 | 2,409 | 2,645 | 2,569 | 2,752 | 2,528 | 2,746 | 2,444 | 2,707 | 3,139 | 2,882 | 4,424 | 4,484 |
| 8 Laryngitis | 867 | 858 | 1,053 | 939 | 1,083 | 1,097 | 1,145 | 1,155 | 1,294 | 1,359 | 1,439 | 1,319 | 1,166 | 1,253 |
| 9 Whooping-cough | 6,862 | 9,622 | 7,770 | 5,518 | 8,022 | 11,200 | 9,770 | 10,185 | 9,225 | 10,138 | 11,648 | 8,976 | 8,555 | 12,309 |
| 10 Influenza | 7,963 | 1,618 | 1,380 | 2,152 | 1,359 | 1,789 | 1,061 | 3,568 | 1,029 | 1,393 | 1,794 | 1,112 | 1,130 | 746 |
| 11 Hydrocephalus | 7,631 | 7,728 | 7,276 | 7,807 | 8,289 | 8,005 | 7,610 | 7,483 | 7,299 | 7,495 | 7,163 | 7,229 | 7,120 | 7,674 |
| 12 Cephalitis | 3,243 | 3,200 | 3,202 | 3,628 | 3,686 | 3,631 | 3,752 | 3,466 | 3,414 | 3,392 | 3,463 | 3,451 | 3,518 | 3,426 |
| 13 Brain, diseases of | 3,138 | 2,859 | 2,930 | 3,101 | 3,507 | 3,444 | 3,614 | 3,580 | 3,304 | 3,963 | 4,454 | 4.086 | 4,865 | 5,105 |
| 14 Convulsions | 22,796 | 23,703 | 23,000 | 24,592 | 24,558 | 24,798 | 24,579 | 24,917 | 23,946 | 24,532 | 25,488 | 25,954 | 25,205 | 25,423 |
| 15 Teething | 4,120 | 4,628 | 4,086 | 4,408 | 4,413 | 4,676 | 4,369 | 4,057 | 3,660 | 3,992 | 4,021 | 3,730 | 3,896 | 4,251 |
| 16 Tabes mesenterica | 4,368 | 4,440 | 4,012 | 4,510 | 4,600 | 4,965 | 5,638 | 4,762 | 4,752 | 5,380 | 5,017 | 4,982 | 4,680 | 5,692 |
| 17 Ulcer. intest. canal, etc. | 830 | 817 | 791 | 856 | 976 | 1,022 | 911 | 876 | 946 | 893 | 860 | 776 | 847 | 856 |
| 18 Diseases intest. canal | 2,258 | 2,305 | 2,247 | 2,235 | 2,159 | 2,000 | 2,018 | 2,362 | 2,357 | 2,438 | 2,750 | 2,698 | 2,866 | 2,786 |
| 19 { Dyspepsia<br>Gastritis }<br>Enteritis } | 5,243 | 4,817 | 4,252 | 4,575 | 4,586 | 4,535 | 4,369 | 4,035 | 4,050 | 4,098 | 816<br>3,412 | 827<br>3,416 | 704<br>3,154 | 809<br>3,333 |
| 20 Peritonitis | 1,418 | 1,304 | 1,248 | 1,250 | 1,301 | 1,269 | 1,432 | 1,388 | 1,310 | 1,411 | 1,466 | 1,555 | 1,551 | 1,563 |
| 21 { Typhus fever<br>Enteric or typhoid f.<br>Simple cont. fever } | 22,037 | 18,339 | 15,374 | 17,930 | 18,641 | 18,554 | 18,893 | 16,470 | 16,182 | 19,016 | 17,883 | 15,877 | 13,012 | 15,440 |
| 22 { Diarrhœa | 11,067 | 17,831 | 11,468 | 14,728 | 17,617 | 14,192 | 20,052 | 12,770 | 13,815 | 21,189 | 13,853 | 18,331 | 9,702 | 18,746 |
| { Dysentery | 2,629 | 3,050 | 2,036 | 2,185 | 2,756 | 1,891 | 1,943 | 1,437 | 1,335 | 1,698 | 1,478 | 1,379 | 1,156 | 1,416 |
| 23 Remittent fever | 614 | 603 | 519 | 607 | 666 | 709 | 646 | 575 | 162 | 270 | 569 | 400 | 314 | 254 |
| 24 Ague | 228 | 171 | 154 | 167 | 151 | 183 | 192 | 149 | 121 | 195 | 207 | 233 | 203 | 149 |

* Compiled from Registrar-General's Report.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Scrofula of uncert. seat Hemorrhage of unc. seat Abscess of uncert. seat | 2,363 | 2,739 | 2,483 | 2,592 | 2,580 | 2,727 | 2,613 | 2,985 | 2,831 | 2,781 | 3,004 | 2,995 | 2,860 | 3,457 |
| 26 | Premature birth / Debility | 16,345 | 17,528 | 18,015 | 18,943 | 19,075 | 18,968 | 18,680 | 17,818 | 17,997 | 19,144 | 7,307 | 7.432 | 7,642 | 7,610 |
| | Atrophy | 10,946 | 11,902 | 10,470 | 12,211 | 13,056 | 13,083 | 14,412 | 14,724 | 13,712 | 15,608 | 26,860 | 27,990 | 26,930 | 29,291 |
| | Inanition | 505 | 582 | 531 | 611 | 647 | 710 | 829 | 941 | 773 | 881 | 1,059 | 1,069 | 1,070 | 1,033 |
| 27 | Causes of death not specified or ill-defined | 14,641 | 10,248 | 9,776 | 9,070 | 9,187 | 9,327 | 8,267 | 8,205 | 7,204 | 6,693 | 5,638 | 5,484 | 5,767 | 5,057 |
| 28 | Tuberculous dis., such as phthisis, tabes mesenterica, hydrocephalus, and scrofula | 66,025 | 65,206 | 60,395 | 64,075 | 66,163 | 70,615 | 67,145 | 67,520 | 63,832 | 65,762 | 65,626 | 65,355 | 65,684 | 68,754 |
| 29 | Probably tub'rcul'us diseases, such as asthma, ulceration of intestinal canal, cephalitis, laryngitis, lungs, diseases of, etc., brain, diseases of, etc., diseases of intestines without name, hemorr'age of unc. seat | 16,901 | 16,747 | 17,206 | 18,298 | 18,289 | 19,089 | 18,339 | 19,639 | 17,862 | 19,091 | 20,618 | 19,936 | 22,011 | 21,802 |
| 30 | Possibly tuberculous diseases, such as bronchitis, pneumonia, pleurisy, influenza, whooping-cough, convulsi'ns, teething, gastritis, enteritis, peritonitis, dyspepsia, debility, atrophy, inanition, ague, remittent fever, typhus fever, enteric fever, simple fev'r, di'rrhœa, dysentery, abscess, uncertain seat, causes of death not specified or ill-defined | 164,777 | 162,922 | 145,930 | 158,076 | 165,477 | 175,228 | 174,034 | 175,626 | 159,591 | 180,173 | 179,924 | 174,993 | 168,484 | 182,111 |

## Table No. I—Continued.

| England and Wales. | 1862 | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population. | 20,336,467 | 20,554,637 | 20,772,308 | 20,990,946 | 21,210,020 | 21,429,508 | 21,649,377 | 21,869,607 | 22,457,366 | 22,782,812 | 23,067,835 | 23,356,414 | 23,648,609 | 23,944,439 | 24,244,010 |
| Total number of deaths | 436,566 | 473,837 | 495,531 | 490,909 | 500,689 | 471,073 | 480,622 | 494,828 | 515,329 | 514,879 | 492,265 | 492,520 | 526,632 | 546,453 | 510,315 |
| Phthisis—consumption | 50,962 | 51,072 | 53,046 | 53,734 | 55,714 | 55,042 | 51,423 | 52,270 | 54,231 | 53,376 | 52,589 | 51,355 | 49,379 | 52,943 | 51,775 |
| Bronchitis | 32,526 | 32,025 | 38,969 | 36,428 | 41,334 | 40,373 | 33,258 | 43,883 | 46,699 | 47,685 | 42,752 | 51,425 | 53,022 | 63,089 | 54,055 |
| Pneumonia | 23,713 | 24,181 | 24,470 | 22,489 | 25,155 | 21,118 | 19,908 | 25,246 | 23,729 | 22,768 | 20,282 | 22,904 | 25,927 | 27,161 | 24,492 |
| Asthma | 4,087 | 3,699 | 4,228 | 3,975 | 3,682 | 3,748 | 3,093 | 3,704 | 3,894 | 3,517 | 2,981 | 3,351 | 3,053 | 3,620 | 2,786 |
| Pleurisy | 833 | 907 | 941 | 866 | 858 | 865 | 905 | 991 | 1,034 | 933 | 977 | 1,004 | 1,287 | 1,476 | 1,286 |
| Lungs, etc., diseases of | 4,928 | 4,907 | 5,158 | 4,812 | 4,934 | 4,793 | 4,519 | 4,916 | 5,090 | 5,292 | 4,869 | 5,119 | 5,397 | 6,106 | 5,495 |
| Laryngitis | 1,478 | 1,561 | 1,610 | 1,382 | 1,286 | 1,285 | 1,420 | 1,657 | 1,740 | 1,630 | 1,532 | 1,823 | 1,926 | 2,175 | 1,920 |
| Whooping-cough | 12,272 | 11,275 | 8,570 | 8,647 | 15,764 | 11,873 | 9,223 | 10,966 | 11,901 | 10,360 | 13,806 | 9,612 | 10,362 | 14,280 | 10,556 |
| Influenza | 915 | 919 | 804 | 596 | 651 | 607 | 306 | 703 | 615 | 348 | 278 | 266 | 245 | 449 | 203 |
| Hydrocephalus | 7,031 | 7,516 | 7,700 | 7,672 | 7,433 | 7,041 | 7,184 | 7,478 | 7,423 | 7,295 | 7,196 | 7,230 | 7,286 | 7,694 | 7,546 |
| Cephalitis | 3,580 | 3,869 | 4,014 | 4,199 | 4,146 | 4,220 | 4,451 | 4,649 | 4,914 | 4,814 | 5,054 | 5,336 | 5,763 | 6,821 | 6,770 |
| Brain, diseases of | 4,927 | 4,876 | 5,159 | 5,321 | 5,605 | 5,671 | 5,374 | 5,517 | 5,556 | 5,602 | 5,446 | 5,728 | 6,129 | 7,122 | 6,482 |
| Convulsions | 25,286 | 26,008 | 26,382 | 26,722 | 27,431 | 26,258 | 25,897 | 26,015 | 26,548 | 25,309 | 25,376 | 26,232 | 27,139 | 26,061 | 25,408 |
| Teething | 3,812 | 4,116 | 4,285 | 4,271 | 4,293 | 4,300 | 4,145 | 4,083 | 4,183 | 4,108 | 4,093 | 4,273 | 4,317 | 5,212 | 4,886 |
| Tabes mesenterica | 5,203 | 5,877 | 5,941 | 6,698 | 6,377 | 6,882 | 6,925 | 6,625 | 6,913 | 6,700 | 6,856 | 6,872 | 6,911 | 8,617 | 7,769 |
| Ulcer. intest. canal, etc. | 870 | 858 | 907 | 851 | 858 | 928 | 981 | 916 | 1,036 | 1,015 | 1,007 | 1,081 | 1,037 | 1,244 | 1,238 |
| Diseases intest. canal | 2,730 | 2,800 | 2,747 | 2,881 | 2,930 | 2,918 | 3,032 | 2,744 | 2,833 | 2,672 | 2,551 | 2,673 | 2,728 | 2,608 | 2,599 |
| Dyspepsia | | | | | | | | | | | | | | | |
| Gastritis } | 765 | 838 | 883 | 802 | 765 | 742 | 758 | 748 | 803 | 775 | 790 | 832 | 923 | 1,029 | 1,020 |
| Enteritis } | 2,911 | 3,234 | 3,164 | 3,289 | 2,928 | 2,858 | 3,038 | 2,944 | 3,037 | 2,914 | 2,758 | 2,851 | 3,091 | 3,176 | 3,120 |
| Peritonitis | 1,488 | 1,637 | 1,736 | 1,633 | 1,504 | 1,571 | 1,738 | 1,668 | 1,825 | 1,788 | 1,847 | 1,998 | 2,407 | 2,165 | 2,071 |
| Typhus fever | | | | | | | | 4,281 | 3,297 | 2,754 | 1,864 | 1,638 | 1,762 | 1,499 | 1,192 |
| Enteric or typhoid f. | 18,721 | 18,017 | 20,106 | 23,034 | 21,104 | 16,862 | 19,701 | 8,659 | 8,731 | 8,461 | 8,741 | 8,793 | 8,861 | 8,913 | 7,550 |
| Simple cont. fever | | | | | | | | 5,449 | 5,882 | 4,575 | 3,415 | 3,122 | 3,112 | 2,651 | 1,974 |
| Diarrhœa | 11,112 | 14,943 | 16,432 | 23,531 | 17,170 | 19,851 | 29,821 | 19,903 | 25,311 | 24,140 | 22,219 | 21,795 | 21,204 | 23,982 | 22,417 |
| Dysentery | 1,044 | 1,051 | 1,000 | 1,072 | 1,096 | 962 | 1,108 | 872 | 815 | 797 | 815 | 719 | 684 | 747 | |
| Remittent fever | 284 | 202 | 80 | 123 | 86 | 69 | 85 | 145 | 132 | 82 | 65 | 79 | 70 | 48 | 87 |
| Ague | 150 | 112 | 117 | 135 | 121 | 94 | 114 | 120 | 131 | 84 | 100 | 114 | 115 | 95 | 121 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scrofula of uncert. seat<br>Hemorrhage of unc. seat<br>Abscess of uncert. seat | 3,416 | 3,27 | 3,111 | 2,963 | 2,901 | 2,938 | 2,769 | 2,846 | 2,718 | 2,640 | 2,587 | 2,750 | 2,752 | 3,092 | 3,089 |
| Premature birth | 7,706 | 8,121 | 8,339 | 8,791 | 8,943 | 8,990 | 8,757 | 8,666 | 9,195 | 9,650 | 10,334 | 10,186 | 10,527 | 11,685 | 11,446 |
| Debility }<br>Atrophy } | 27,077 | 28,193 | 29,634 | 32,161 | 31,097 | 32,317 | 32,654 | 29,954 | 30,530 | 30,458 | 29,983 | 30,333 | 30,995 | 28,393 | 27,286 |
| Inanition | 1,079 | 1,212 | 1,359 | 1,484 | 1,484 | 1,546 | 1,602 | 1,460 | 1,487 | 1,332 | 1,277 | 1,233 | 1,513 | 1,650 | 1,351 |
| Causes of death not specified or ill-defined | 4,788 | 4,955 | 4,478 | 5,227 | 4,993 | 4,628 | 3,904 | 3,671 | 4,228 | 4,011 | 3,603 | 3,439 | 3,845 | 3,234 | 2,844 |
| Tuberculosis dis., such as phthisis, tabes mesenterica, hydrocephalus, and scrofula | 66,612 | 67,742 | 69,798 | 71,067 | 72,425 | 71,903 | 68,301 | 69,219 | 71,285 | 70,011 | 69,228 | 68,207 | 66,328 | 72,346 | 70,179 |
| Probably tub'rcul'us diseases, such as asthma, ulceration of intestinal canal, cephalitis, laryngitis, lungs, diseases of, etc., brain, diseases of, etc., diseases of intestines without name, hemorr'age of unc. seat | 22,600 | 22,570 | 23,823 | 23,421 | 23,441 | 23,593 | 22,870 | 23,903 | 25,093 | 24,542 | 23,440 | 25,111 | 26,033 | 29,696 | 27,290 |
| Possibly tuberculous diseases, such as bronchitis, pneumonia, pleurisy, influenza, whooping-cough, convulsi'ns, teething, gastritis, enteritis, peritonitis, dyspspsia, debility, atrophy, inanition, ague, remittent fever, typhus fever, enteric fever, simple fev'r, diarrhœa, dysentery, abscess, uncertain seat, causes of death not specified or ill-defined | 176,482 | 181,971 | 191,870 | 201,240 | 206,828 | 195,928 | 197,886 | 200,361 | 210,015 | 203,429 | 195,376 | 202,720 | 211,411 | 226,937 | 203,300 |

## Table No. I—Concluded.

| England and Wales. | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 | 1885 | 1886 | 1887 | 1888 | 1848 | 1888 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population. | 24,547,309 | 24,854,397 | 25,165,336 | 25,708,666 | 26,055,406 | 26,413,864 | 26,770,744 | 27,132,449 | 27,499,041 | 27,870,586 | 28,247,151 | 28,628,804 | Mortality per 1000 living. | | |
| Total number of deaths | 500,496 | 539,872 | 526,255 | 528,624 | 491,935 | 516,654 | 522,997 | 530,828 | 522,750 | 537,276 | 530,758 | 510,971 | 22.97 | 17.85 | 1 |
| Phthisis—consumption | 51,353 | 52,856 | 51,274 | 48,201 | 47,541 | 48,715 | 50,053 | 49,325 | 48,175 | 47,872 | 44,935 | 44,248 | 2.97 | 1.54 | 2 |
| Bronchitis | 54,006 | 60,742 | 71,419 | 57,939 | 55,870 | 57,853 | 58,744 | 53,410 | 60,963 | 61,438 | 58,983 | 57,571 | .834 | 2.007 | 3 |
| Pneumonia | 23,696 | 24,763 | 27,174 | 25,166 | 23,702 | 26,058 | 28,195 | 26,246 | 29,376 | 28,098 | 30,983 | 30,844 | 1.260 | 1.078 | 4 |
| Asthma | 2,469 | 2,548 | 2,871 | 2,145 | 2,696 | 2,450 | 2,689 | 2,368 | 2,581 | 2,434 | 2,475 | 2,388 | .220 | .083 | 5 |
| Pleurisy | 1,117 | 1,118 | 1,369 | 1,310 | 1,334 | 1,312 | 1,584 | 1,454 | 1,677 | 1,467 | 1,611 | 1,559 | .059 | .054 | 6 |
| Lungs, etc., diseases of | 5,387 | 5,650 | 6,000 | 6,871 | 4,316 | 4,535 | 4,886 | 4,502 | 5,359 | 5,156 | 5,127 | 4,639 | .152 | .162 | 7 |
| Laryngitis | 1,868 | 1,893 | 2,070 | 1,831 | 1,160 | 1,444 | 1,499 | 1,650 | 1,597 | 1,440 | 1,605 | 1,590 | .049 | .055 | 8 |
| Whooping-cough | 11,358 | 17,784 | 12,752 | 13,662 | 10,830 | 15,259 | 10,471 | 11,476 | 13,106 | 12,936 | 11,251 | 12,287 | .395 | .429 | 9 |
| Influenza | 205 | 195 | 266 | 171 | 99 | 95 | 107 | 62 | 138 | 83 | 85 | 92 | .459 | .003 | 10 |
| Hydrocephalus | 7,881 | 8,460 | 8,158 | 8,514 | 7,176 | 6,959 | 6,986 | 7,124 | 6,874 | 7,073 | 6,581 | 6,743 | .440 | .239 | 11 |
| Cephalitis | 6,910 | 7,449 | 7,387 | 8,270 | 7,306 | 8,122 | 7,490 | 8,625 | 8,126 | 9,309 | 8,924 | 8,688 | .187 | .303 | 12 |
| Brain, diseases of | 6,700 | 7,031 | 7,222 | 6,871 | 3,907 | 4,309 | 4,690 | 4,848 | 4,429 | 4,318 | 4,470 | 4,519 | .180 | .157 | 13 |
| Convulsions | 24,147 | 24,700 | 23,853 | 23,503 | 22,000 | 23,021 | 22,677 | 23,056 | 21,702 | 22,873 | 21,659 | 20,764 | 1.320 | .725 | 14 |
| Teething | 4,470 | 4,659 | 4,256 | 4,124 | 4,550 | 4,673 | 4,762 | 4,942 | 4,653 | 4,899 | 4,219 | 4,235 | .237 | .147 | 15 |
| Tabes mesenterica | 7,812 | 8,703 | 7,617 | 9,536 | 7,402 | 8,246 | 7,683 | 7,579 | 6,825 | 8,265 | 7,034 | 6,774 | .251 | .236 | 16 |
| Ulcer. intest. canal, etc. | 1,245 | 1,235 | 1,165 | 1,225 | 409 | 410 | 697 | 689 | 744 | 570 | 423 | 366 | .047 | .011 | 17 |
| Diseases intest. canal | 2,965 | 2,880 | 2,742 | 1,922 | 1,091 | 1,156 | 1,004 | 747 | 553 | 570 | 501 | 863 | .130 | .030 | 18 |
| Dyspepsia | | | 364 | 426 | 403 | 484 | 477 | 507 | 447 | 520 | 528 | 457 | | | |
| Gastritis | 941 | 995 | 984 | 1,037 | 2,555 | 2,548 | 2,458 | 2,768 | 2,800 | 3,437 | 3,424 | 3,329 | .302 | .258 | 19 |
| Enteritis | 2,899 | 3,282 | 2,770 | 3,463 | 2,720 | 2,974 | 2,888 | 3,240 | 2,979 | 3,949 | 3,651 | 3,621 | | | |
| Peritonitis | 1,971 | 1,924 | 1,963 | 2,154 | 2,028 | 2,015 | 2,265 | 2,393 | 2,362 | 2,333 | 2,370 | 2,422 | .081 | .084 | 20 |
| Typhus fever | 1,104 | 906 | 538 | 530 | 552 | 940 | 877 | 328 | 318 | 245 | 211 | 168 | | | |
| Enteric or typhoid f. | 6,879 | 7,652 | 6,860 | 6,710 | 5,529 | 6,036 | 6,078 | 6,380 | 4,765 | 5,069 | 5,155 | 4,848 | 1.270 | .190 | 21 |
| Simple cont. fever | 1,923 | 1,776 | 1,472 | 1,490 | 1,159 | 1,016 | 963 | 768 | 662 | 605 | 507 | 436 | | | |
| Diarrhœa | | | | | | | | | | | | | | | |
| Dysentery | 15,282 | 25,103 | 11,463 | 30,185 | 17,185 | 14,536 | 15,933 | 26,412 | 13,398 | 24,748 | 20,242 | 12,839 | .789 | .440 | 22 |
| Remittent fever | 92 | 82 | 76 | 249 | 246 | 194 | 177 | 148 | 89 | 88 | 100 | 141 | .035 | .004 | 23 |
| Ague | 119 | 135 | 91 | 113 | 99 | 94 | 99 | 141 | 138 | 127 | 93 | 78 | .013 | .002 | 24 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scrofula of uncert. seat | 3,493 | 3,530 | 3,348 | 3,735 | 3,785 | 4,140 | 4,268 | 4,592 | 4,281 | 4,865 | 4,971 | 4,917 | .136 | .171 | 25 |
| Hemorrhage of unc. seat | | | | | 159 | 182 | 181 | 143 | 186 | 144 | 175 | 105 | | * | |
| Abscess of uncert. seat | | | | | 636 | 656 | 641 | 707 | 658 | 645 | 671 | 573 | | * | |
| Premature birth | 11,618 | 12,002 | 11,929 | 12,266 | 12,043 | 12,436 | 12,872 | 13,076 | 12,904 | 13,642 | 14,085 | 14,063 | 1.602 | 1.226 | 26 |
| Debility, Atrophy | 25,533 | 26,658 | 24,752 | 26,704 | 22,699 | 23,318 | 24,399 | 24,937 | 22,131 | 24,146 | 21,879 | 21,049 | | | |
| Inanition | 1,705 | 1,884 | 1,735 | 1,881 | | | | | | | | | | | |
| Causes of death not specified or ill-defined | 1,856 | 1,683 | 1,329 | 1,115 | 3,562 | 3,260 | 3,778 | 3,529 | 3,288 | 3,147 | 3,166 | 2,814 | .838 | .122 | 27 |
| Tuberculous dis., such as phthisis, tabes mesenterica, hydrocephalus, and scrofula | 70,539 | 73,549 | 70,397 | 69,986 | 65,904 | 68,160 | 68,990 | 68,620 | 66,158 | 68,075 | 63,521 | 62,682 | 3.807 | 2.189 | 28 |
| Probably tub'rcul'us diseases, such as asthma, ulceration of intestinal canal, cephalitis, laryngitis, lungs, diseases of, etc., brain, diseases of, etc., diseases of intestines without name, hemorr'age of unc. seat | 27,544 | 28,686 | 29,457 | 29,135 | 20,885 | 22,426 | 22,955 | 23,429 | 23,369 | 23,797 | 23,525 | 23,154 | .974 | .808 | 29 |
| Possibly tuberculous diseases, such as bronchitis, pneumonia, pleurisy, influenza, whooping-cough, convulsi'ns, teething, gastritis, enteritis, peritonitis, dyspepsia, debility, atrophy, inanition, ague, remittent fever, typhus fever, enteric fever, simple fev'r, diarrhœa, dysentery, abscess, uncertain seat, causes of death not specified or ill-defined | 190,918 | 218,037 | 207,465 | 214,003 | 189,172 | 198,099 | 199,816 | 205,080 | 198,554 | 214.639 | 204,918 | 194,190 | 9.502 | 6.783 | 30 |

* Counted in with causes of death not specified

## Table No. II.

(For explanation see page 58.)

| | Year | 1864 | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 | 1885 | 1886 | 1887 | 1888 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | Vienna | | 8.292 | 8.243 | 7.613 | 7.829 | 7.446 | 8.251 | 8.206 | 7.520 | 6.916 | 6.228 | | | | | | | 6 959 | | | | | | | |
| Austria | Buda Pesth | | | | | | | | | 6.368 | 6.678 | 7.700 | 7.814 | 9.158 | | | | | 7.764 | | | | | | | |
| Austria | Lemberg | | | | | | | | | | | | | | | | | | 7.352 | | | | | | | |
| Austria | Bucharest | | | | | 3.800 | 3.697 | | | | | 2.920 | | | | | | | 3.880 | | | | | | | |
| Austria | Prague | | 8.594 | 7.282 | 8.122 | 9.157 | 8.514 | 8.560 | 9.855 | 8.597 | 7 937 | 8.252 | | | | | | | | | | | 8.999 | | | |
| Austria | Trieste | | 4 483 | 4.309 | 4.172 | 4 329 | 4.568 | 4.484 | 4.853 | 4.310 | 4.438 | 4.700 | | | | | | | 5 201 | | | | | | | 4.543 |
| Italy | Rome | | | | | | | | | 4.906 | 4.261 | 3.928 | | | | | | | | | | | | | | 2 495 |
| Italy | Turin | | 2.740 | 2.563 | 2 621 | 2.692 | 2.563 | 2.416 | 2.298 | 2.697 | 2.439 | 1.973 | | | | | | | | | | | | | | |
| Italy | Naples | | | | | | | | | | 2.715 | 2.853 | 2.467 | | | | | | | | | | | | | |
| Italy | Venice | | | 3.174 | 1.669 | 2.379 | 2.501 | 2.115 | 1.618 | 2 893 | 2.262 | 2.459 | 2.529 | | | | | | | | | | | | | |
| Italy | Palermo | | | | | | | | | | 2.806 | 2.896 | | | | | | | | | | | | | | |
| Germany | Berlin | | | | | | 3.537 | 3.908 | 42.13 | 3.757 | 3 356 | 3.300 | 3.520 | 3.290 | 3 540 | 3 370 | 3.250 | 3 470 | 3 300 | 3.218 | 3 445 | 3.455 | | | 2.977 | 2.954 |
| Germany | Munich | | | | | 3.743 | 4.466 | 5.014 | 5.981 | 5.102 | 4.930 | 3 690 | | | | | | | 3 875 | | | | | | | |
| Germany | Cologne | | | | | | | | 7.035 | 5 535 | 5.191 | 5.027 | 5.190 | | | | | | 3 840 | | | | | | | |
| Germany | Breslau | 4.52 | 4 75 | 4.394 | 4.819 | 4.787 | 4.765 | 4.020 | 3.742 | 3.206 | 3.213 | 2.702 | 2.862 | 3.00 | 3 06 | 2.57 | 2.45 | 2.39 | 2.33 | 3.59 | | | | | | |
| Germany | Hamburg | | | | | | | | 5.544 | 4.848 | 4.944 | 4.729 | | | | | | | | | | | | | | |
| Germany | Leipsic | | | | | | | | | 3.470 | 3.380 | 3.797 | 3.373 | | | | | | | | | | | | | |
| Germany | F'n'kf't, a-m | | | 3.416 | 3.740 | 3.559 | 3.790 | 4 221 | 5.028 | 3.590 | 4.067 | 3.795 | 3 638 | | | 4.000 | 4.120 | | 3.610 | | | | | | | |
| | Hague | | | | 2.627 | 2.043 | 1.966 | 2.578 | 2.428 | 2.144 | 2.476 | 2.439 | | | | | | | | | | | | | | |
| | Rotterdam | | | | 2.408 | 2.549 | 2 583 | 2.859 | 2.862 | 2.702 | 2.454 | 2.578 | | | | | | | | | | | | | | |
| | Antwerp | | | | | 3.592 | 3 099 | 3.511 | 3.680 | 3.162 | 2.922 | 3.127 | | | | | | | | | | | | | | 2.358 |
| | Liege | | 4.541 | 4.662 | 4.097 | 3.712 | 3.726 | 3.784 | 4.308 | 4.087 | 3.647 | 3.737 | | | | | | | | | | | | | | 2.166 |
| | Cop'nhag'n | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Christiana | | | 3.577 | 3 478 | 3.537 | 2.911 | 3 104 | 3.798 | 3.561 | 3.107 | 3 358 | 3.619 | | | | | | | | | | | | | |
| | Stockholm | 4 489 | 4.025 | 3.824 | 3.732 | 3 182 | 4.002 | 3.749 | 3.580 | 3.443 | 3.314 | | | | | | | | 3 937 | | | | | | | |
| | Moscow | | | | | 5.643 | 5.216 | 5.088 | 5.912 | 6.133 | | | | | | | | | | | | | | | | |
| | Paris | | | | | | 4.623 | 4.623 | 6.480 | 4 015 | 4.266 | 4.319 | 4.649 | | | | | | 4 219 | | | | 4 537 | | | 4.482 |
| | London | 3.09 | 2.91 | 3.11 | 2.89 | 2.87 | 2.78 | 2.78 | 2.65 | 2.58 | 2 59 | 2.51 | 2.66 | 2.63 | 2.51 | 2.63 | 2.24 | 2.47 | 2 24 | 2 21 | 2.25 | 2.18 | 2 05 | 2 026 | 1 858 | 1.750 |
| | Phila. | 3.435 | 3.370 | 3.131 | 3.038 | 3.061 | 2.981 | 3.424 | 3.195 | 3.213 | 3 054 | 3.118 | 2.948 | 3.241 | 2.760 | 2.843 | 2.741 | 3 178 | 3.188 | 3.168 | 3 084 | 3 018 | 2 971 | 2 927 | 2.817 | 2 650 |
| | England | 2.54 | 2.54 | 2.60 | 2 53 | 2.34 | 2.35 | 2.41 | 2 34 | 2.27 | 2.19 | 2.08 | 2.20 | 2.12 | 2.07 | 2 11 | 2 02 | 1.87 | 1 82 | 1 84 | 1.870 | 1.812 | 1.752 | 1.718 | 1.591 | 1.541 |
| | Germany | | | | | | | | | | | | | | | | | | 3 089 | 3 088 | 3 180 | 3 106 | 3 080 | | | |

*Compiled from Korosi, Schlokow, Communi di Roma Bollettino Demograficameterico, Bollettino, Statistica, mensile della Citta di Trieste, Registrar-Generals Report, Philadelphia Health Reports, Bulletin statistique demographique et medicale, Zeitschrift des Preus. Statist., Health Report of City of Prague.

## Table No. III.

SPECIAL HOSPITALS FOR THE TREATMENT OF TUBERCULOSIS, IN ENGLAND.[1]

| Name of Hospital. | F'n'd'd | Approximate Number of In-patients | | | | | |
|---|---|---|---|---|---|---|---|
| | Year. | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 |
| Royal Sea-bathing Infirmary for Scrofula. | 1791 | | | | | | |
| Royal Hospital for Diseases of Chest. | 1814 | | | | | | |
| Brompton Hospital for Cons. and Diseases of Chest. | 1841 | | | | | | |
| Infirmary for Consumption and Diseases of the Chest. | 1847 | | | | | | |
| City of London Hospital for Diseases of the Chest. | 1848 | | | | | | |
| Western Hospital for Incipient Consumption. | 1850 | | | | | | |
| Nation. Sanatarium for Consumption and Dis Chest. | 1855 | | | | | | |
| North London Hospital for Consumption. | 1860 | | | | | | |
| Liverpool Hospital for Consumption and Dis. Chest. | 1864 | 500 | 2000 | 3000 | 4500 | 5500 | 7000 |
| Alexander Hospital for Children with Hip-disease. | 1867 | | | | | | |
| Fir's Home for Advanced Consumptives. | 1868 | | | | | | |
| Royal Nat. Hosp. for Consumption and Dis. Chest. | 1869 | | | | | | |
| Hospital for Children with Hip-disease | 1872 | | | | | | |
| Manches. Hospital for Consumption and Dis. Chest. | 1875 | | | | | | |
| Cons. Department Belfast Royal Hospital. | 1875 | | | | | | |
| Northern Counties Hospital for Diseases Chest. | 1878 | | | | | | |
| Belfast Hosp. for Consumption and Dis. Chest. | 1880 | | | | | | |
| St. Leonard's Hospital for Dis. Chest and Throat. | 1884 | | | | | | |

[1] Compiled from "Medical Directory of United Kingdom"

investigations on the subject of tuberculosis undoubtedly place upon us responsibilities which we must not shirk if we wish to prove faithful to our high calling.

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## DISCUSSION.

Dr. J. C. Wilson: Dr. Flick has done in the past, and is still doing, admirable work in striving to excite interest among the profession in the general subject of the tuberculous diseases, and especially in regard to consumption. His excellent papers have attracted much attention and done a great deal to mould thought and to excite discussion.

The traditional view in regard to the diathetic nature of consumption, a view necessarily gloomy, has in the course of the past decade been confronted by the more hopeful theory, by no means new, but now strongly supported by facts, that the tuberculous diseases are infectious. Being infectious, they are directly and indirectly inoculable, and, therefore, contagious. In view of the facts, this theory of the disease is not only a more satisfactory one as regards treatment, but it also opens up a large field of hope as regards prophylaxis. Papers like this of Dr. Flick's cannot fail to excite opposition and controversy among those who direct their attention to the subject of phthisis. I confess, that in the absence of the tables to which reference has been made by the author, the deductions from his figures strike me as hardly supported by the facts which he has presented. That the relatively insignificant number of cases of tuberculosis taken from the population of Great Britain, or a number not exceeding six thousand taken from the population of New England, should during the course of forty years have made such an impression upon the prevalence of phthisis, as to reduce its mortality fifty per cent., is scarcely credible. It would be difficult, in the absence of actual demonstration, to accept the institution of special hospitals for the treatment of this disease as a probable, or even possible explanation, of such a reduction in the mortality.

An argument for the institution of hospitals for tuberculous diseases upon a large scale is to be found in the history of leprosy in the British Isles. Leprosy prevailed in Great Britain for thirteen hundred years, disappearing at the commencement of the present century. Its extinction is unquestionably due to the fact that lepers were rigorously segregated for five or six centuries. If the tuberculous diseases are communicable, in this fact alone is an adequate reason for efforts to increase the number of special hospitals of the kind under discussion. A hospital for consumptives would have the advantage of awakening among the people a proper and reasonable uneasiness in regard to the communicability of the disease, and of extending and giving precision to proper efforts for prophylaxis.

The growth of such a feeling would react favorably upon the profession itself, and lead to the habitual exercise of rational and scientific measures to prevent the communication of these diseases.

The practical outgrowth of the recognition of the contagiousness of phthisis will be, first, a closer study of the methods of its communication from the sick to the well; and, second, a greater success in preventing its extension. If phthisis is an infectious and communicable disease, it is also a preventable disease; and the hope that in the course of time consumption will disappear, as typhus fever, the plague, and leprosy have disappeared from the civilized world, is no mere chimera. The teachings of history are not to be disregarded. Each historical epoch has had its characteristic diseases. Changes in modes of living, the diffusion of knowledge, the advance of civilization, leading as they do to the recognition of the causes of particular diseases, result in their gradual extinction. I certainly am among those who hold that one among the measures which would be of the greatest service in restricting the spread of pulmonary consumption—a process that must of necessity be a slow one, extending from year to year, from decade to decade, from century to century—would be the establishment of separate hospitals, upon a large scale, for the treatment of tuberculous diseases, and the foundation of such hospitals in every large community.

Dr. S. Solis-Cohen: For reasons different from those advanced either by Dr. Flick or Dr. Wilson, I am at one with them in the recommendation of the establishment of special hospitals for the treatment of consumptives. Dr. Flick has certainly done great service in the industry and zeal which he has devoted to the compilation of statistics, which, however mistaken may be the deductions drawn from them, will still be of permanent value.

Whether or not the disease is contagious I shall not discuss, although incidentally I may refer to the measures taken by some of the Italian States, notably Naples, which more than a century ago enforced severe measures of isolation, with no appreciable effect in diminishing morbidity.

One view of Dr. Flick's paper which struck me forcibly is that the reduction in mortality which he shows may be due, as he claims, in large measure to the establishment of special hospitals; but not because a small proportion of sufferers has been isolated. Rather would I attribute it to the fact that the people and physicians themselves have been taught to take a more hopeful view of the disease, and have learned better how to manage it. I believe that the great mortality of consumption is due to the fact that many members of the profession do not know how to treat their cases. They do not realize the importance of special individualizing methods. It is so much easier to write prescriptions than to keep proper watch over diet and daily life, or to resort to artificial feeding, inhalations, and other therapeutic measures requiring time and skill. Death is due, also, in a large proportion of cases, to the fact that in private practice it is often impossible to carry out special, individualizing, nutritive measures. As a rule, the treatment of

consumption must be directed to reëstablishing the nutrition of the patient. We may discard medicines, so called, very largely. Whether, as I believe, failure of nutrition is the whole disease, or as Dr. Flick and Dr. Wilson would argue, predisposes to the reception of the exciting cause, it offers in either event the only successful point of attack; and the experience of those who have devoted their attention to this subject shows that the only available means of fighting the disease is to resort to those measures which tend to build up the patient locally and generally. In a large number of cases the only place where such measures can be properly carried out is in a special institution with a corps of trained physicians and nurses, and all the means and appliances at hand to furnish patients what they require. For two reasons the treatment of consumptives in general hospitals is a failure. It is impossible to secure the proper diet and the necessary attention that these cases require; and, therefore, the hopeful encouragement to persistence which success might inspire, is not developed. This must be so, because the physicians and nurses of such institutions are necessitated by the exigencies of the situation to concentrate their forces upon acute cases.

The mistake made in this country in establishing institutions for consumptives is that most of them have been made homes for incurables; places where the hopelessly diseased go to die; and not institutions where every possible means is employed to restore the patients to health. The reduction of fifty per cent. in the mortality in England should be continued and increased, and it can be. I strongly advocate the establishment of special hospitals where those who have the disease can be treated and restored to health and show others that it is a curable disease, and where physicians can go and learn how to treat their patients, and to take a hopeful view and inspire their patients with hope. The Adirondack cottages have been very successful, but I believe that it is not necessary to go to a special climate to establish these institutions. They can be made successful in Philadelphia and almost any other city in the United States, except, perhaps, in such places as Boston and New York which have peculiarily unfavorable climatic conditions.

I hope that this paper will succeed in forcing the subject upon the attention of the profession, and convict us in our own minds of our terrible remissness.

Dr. Frederick P. Henry: I rise especially to call attention to a fact which appears to have been entirely overlooked in this discussion—viz., that there is a hospital for consumptives at Chestnut Hill, under the management of the Protestant Episcopal City Mission. I am in favor of hospitals for consumptives, but my reasons for supporting such a measure differ from those advocated by the reader of this evening's paper, in that they have little to do with the contagious or infectious character of the disease. To argue in favor of separate hospitals for the treatment of consumption on the ground of its contagious nature is, in my opinion, to support a weak cause.

The object of separate hospitals for the contagious exanthemata is to prevent the spread of the disease to neighboring patients. A case of smallpox admitted into a general hospital will surely infect all in that ward who are not protected by a previous attack of the same disease, or by vaccination. Are there any similar facts with reference to phthisis? My experience leads me to answer this question in the negative, and I respectfully submit that, in the discussion of this important question, the greatest weight should be laid upon such facts as are derived from a large personal experience. It seems to me that the necessity of separate hospitals for the treatment of consumption, on the ground of its contagious nature, would be first perceived and advocated by physicians in attendance upon large general hospitals. For my part, I cannot point to a single instance of the transmission of phthisis from one hospital inmate to another. Before I was asked to take part in this discussion, I had supposed that a Mrs. A., who was for many years in charge of a ward devoted to diseases of the chest, had acquired the phthisis from which she died by constant attendance upon phthisical patients. Since then, however, I have made inquiry of Dr. Knight, the well-known superintendent of the Episcopal Hospital, and he tells me that Mrs. A. was phthisical before she entered the hospital as a nurse, and had lost two children from phthisis. Dr. Knight further tells me that his thirty years' experience as hospital superintendent has not furnished him with a single instance of the transmission of phthisis from one patient to another. I am aware that there are facts which seem to point to the opposite conclusion, but I must confess to a natural prejudice in favor of my own observations.

I am in favor of separate hospitals for consumptives:

1. Because their stay in such institutions is, as a rule, a long one.

2. Because the cases which seek hospital treatment are practically incurable.

3. Because special nursing, special cooking, and special arrangements for in- and out-door exercise are requisite in their treatment.

I say nothing about special medication, because, in my opinion, the best therapeutic results have been accomplished by general constitutional measures.

The special features of phthisical cases, particularly their protracted course, make it desirable that the surroundings of hospitals devoted to their treatment should be as cheerful and home-like as possible. These indications are admirably fulfilled in the famous Brompton Hospital of London, and their importance is thoroughly understood by the management of the Home for Consumptives of this city. I hand round, for your inspection, plans of this building as it now exists, and as it will be when complete. I am indebted to the Rev. Herman L. Duhring, not only for the drawings, but also for much valuable information concerning hospitals for consumptives, both here and abroad, and I can assure the Fellows of this College that the importance of the subject under discussion is thoroughly understood by what

we call the laity, who are quietly laying the foundations of a model hospital for consumptives.

Dr. E. O. Shakespeare: I have been interested in all the communications of Dr. Flick concerning tuberculosis, mainly, however, from the standpoint of prophylaxis. I consider his last communication as one of the most important, not only because of the exhaustive studies he has made of statistics in its preparation, but principally because it is the first time that he has presented to the College a proposition looking to practical measures of prophylaxis. I may say I am heartily in accord with him as to the advantage of the establishment of separate hospitals for the treatment of consumptive patients. I take this ground for reasons different from those referred to by the author and by the last two speakers. For myself, I have no special interest in the establishment of such hospitals for the mere treatment of the inmates who may, from time to time, come within the walls of these institutions, but it is only as a preventive measure which may lessen the spread of tuberculosis and as a means of materially diminishing the mortality, not only among those who go the hospital, but also among the general community accessible thereto.

I believe firmly in the infectiousness of tuberculosis and the infectious nature of many of the secretions and excretions of persons affected with the disease. For myself, I have no doubt whatever that the tubercle bacillus, discovered by Koch in 1881 and 1882, is the specific infectious agent, and that without its action the generation of tuberculosis is impossible. I believe that the propagation of tuberculosis finds its chief explanation in the infectiousness of the discharges from tuberculous patients or tuberculous animals, and that it has nothing to do with heredity, except in so far as heredity may produce a weakened resistance or a receptivity to the disease, somewhat similar to the receptivity of a soil which we prepare for the sowing of any seed. That, however, may be at present only a matter of belief. To my mind the facts are far more numerous and exact in support of the view of the infectious nature of all cases of tuberculosis than are the facts supporting any other opinion in medicine, without any exception whatever.

I am in favor of the adoption of any practical means by which we can narrow the diffusion of the infectious agents existing in the discharges from the tuberculous, and for that reason I am heartily in favor of efforts looking to the establishment, either by private subscription or by the municipality or State (preferably the latter), of separate hospitals for the reception of consumptive patients. Such institutions would be of advantage to the community at large, outside of those who might go to the hospital for treatment. The infectious agent of tuberculosis is cast off in the sputum in our streets, in our public halls, and wherever else the consumptive patient expectorates. His sputa become dry and pulverized, and by the action of the air the bacilli are carried to our nostrils; thus all are more or less exposed to the infection of the disease. By preventing six, eight, or ten thousand people a year

from going around and casting off these tubercle bacilli among the general public, we, to that extent, lessen exposure and thereby the general mortality among the community at large. I think that this view is much nearer the explanation of the marked reduction in the mortality from consumption in England than that suggested by Dr. Cohen, whose idea seems to be that it is to be explained by the awakening of the physicians throughout the community to the fact that the disease needed better treatment, and to their superior instruction as to its proper treatment. I doubt if that would go far toward explaining the reduced mortality of the disease, for, as the tables of Dr. Flick seem to indicate, there has not been a similar reduction in the mortality of other common diseases. I do not think it reasonable to suppose that great advances have been made only in England in regard to the proper treatment of phthisis pulmonalis, and, so far as the scientific treatment of all forms of disease is concerned, I am not ready to admit that England leads the world. If I am right in this, I cannot see why the great reduction in mortality which has occurred in England has not been experienced also in other parts of the world, where the population has the advantage of scientific treatment of the highest order.

I not only favor the establishment of special hospitals, but I would make it obligatory on every hospital in this city to assign patients with any tubercular condition to separate wards. Where this may not be possible for the present, it seems to me that it certainly would be feasible to separate consumptives from association with patients suffering with other disease of the lungs. It has certainly been shown in the last eight or ten years that the presence of any catarrhal condition of the lungs greatly predisposes to the acquisition of phthisis pulmonalis. After an attack of bronchitis, pneumonia, or other disease of the lungs, there is a soil sometimes well prepared for the reception and fructification of the bacillus. In the early history of bacteriology it was thought that all that was necessary to excite a bacterial disease was to introduce the seed ; but that idea has been exploded, for it has been clearly shown that there must be a soil in a state of favorable preparation in order to bring forth the crop. Another well-determined fact is that every healthy animal is endowed with a great but variable power of resisting the invasion of any of these bodies. This fact, together with the fact that not one seed alone, but, as a rule, thousands are necessary to be introduced in order to produce the disease, explains the rarity of cases of consumption as compared with the great number exposed to the infecting agent, if we consider the tubercle bacillus as the cause of the disease.

I hold in my hand some abstracts from reports stating significant observations. One of these is important in its bearing upon the question of contagiousness or infectiousness. It relates to infected dwellings rather than to direct transmission from individual to individual. It is an abstract of a paper by George Cornet, prepared under the direction of Koch, concerning the etiology of tuberculosis. He found that the walls of the majority of

hospitals where consumptives have been attended to, and that the walls of most old dwellings, contain tubercle bacilli in the dust scraped from such walls. These bacilli were living, and when introduced into animals produced the disease. These experiments have been conducted with extreme care and with numerous control experiments. For instance, one method was to introduce the material into a susceptible animal and into a similar animal the same material was injected after being sterilized by heat. In the former tuberculosis was excited, and, in the latter, no effect was observed. Taking again the sterilized dust and adding sputum from a consumptive patient, the disease was produced.

I have here a reference which bears upon one point referred to by Dr. Henry, and is in strong opposition to his views. It is an abstract of another paper by Dr. Cornet on the mortality of nurses. He made a thorough study of the general death-rate of towns and cities as compared with the death-rate among nurses in hospitals. His statistics run over a period of twenty-five years. Of the number of nurses which he collected, 2099 died. Of this number, 1320, or 62 per cent., died of tuberculosis; 177, or 8 per cent., died of typhus fever—a markedly contagious disease—and other contagious diseases caused a smaller proportion of the mortality. These are striking figures. According to this investigation the mortality from tuberculosis has its maximum between the ages of twenty-five and forty years, declining in subsequent decennial epochs. As compared with the entire population, the death-rate from tuberculosis among nurses from fifteen to twenty years of age is six times greater; between twenty and thirty years, four and a half times greater; from thirty to forty years, three and a half times greater. The other contagious diseases show the greatest mortality at similar periods, but it is small as compared with that of tuberculosis. The expectation of life of a nurse at seventeen years is only nineteen years; among the general population it is forty-one years. Among nurses at twenty years, the expectation of life is almost the same as ordinarily at fifty-two years.

I wish to refer to another report, also made in Germany, which illustrates one of the ways in which tuberculosis may be produced in a family and stick to that family as long as it remains in the original dwelling without invoking the doubtful agency of heredity—namely, a paper by Dr. Engelmann, published in 1889, concerning the "The Propagation of Tuberculosis by Dwellings." He selected, on account of its salubrity of location and general excellent hygienic surroundings, a certain village in the neighborhood of Berlin which had been constructed in 1865—a village of some eleven houses. In the first twelve years there was only a single death therein from tuberculosis. In the next eight years there were seven deaths, but limited to the inhabitants of a certain flat, among twenty-five people who had inhabited it. These deaths followed one after another, *after the disease was brought from a distance by a family, two of whose members died in the house.* During these eight years the only deaths from this disease were

those which occurred in the house mentioned, which during this time was occupied by several different families which, previous to occupancy, had been free from tuberculosis or any hereditary predisposition to it.

In conclusion, I would say that I am in favor of advocating the establishment of special consumptive hospitals, not because they are a public charity to those afflicted, but as a means of preventing the spread of the disease, and as a measure affording a considerable degree of protection of the well against exposure to infection. I think that in the case of a disease which carries off one in five or one in seven of our population, in the light which we have at the present time concerning the infectious nature and modes of dissemination of the disease, we should awaken to the importance and the necessity of action. Not only should we accept these facts concerning the etiology of tuberculosis as a theory, but act upon the knowledge which investigations have furnished us for the protection of the community whose lives we have in our charge, for if an ounce of prevention is ever equal to a whole pound of cure, it is assuredly so in dealing with tuberculosis.

Dr. L. Turnbull: The first objection I make is to the name "consumptive hospital or home," which in itself is depressing, and all depressing influences should be avoided in the treatment of so formidable a disease. If possible, everything about them should inspire *hope*. Second. The collecting together of a number of consumptives in a ward has most serious objections, viz., the constant and persistent coughing not only prevents the patient from sleeping but prevents other light sleepers from obtaining refreshing sleep, and also tends, by imitation, to cause others to cough.

There should not be more than one patient in a room. Even when patients are congregated together in cottages it is of great importance that they shall not be near enough to hear the constant cough of those in the second or third stage of the disease, and some means should be taken to prevent the sound from reaching the adjoining houses. The gathering together of several patients in the second or third stage of phthisis, even for amusement or recreation, is objectionable, as the profuse expectoration loaded with bacilli and the dried material from handkerchiefs contaminate the air and surroundings and develop an incipient case into a confirmed one, and even inoculate an apparently healthy individual. So many deaths seen in a consumptive hospital have a most depressing influence on mind, spirits, and body, destroying the appetite, etc. No healthy person should sleep in the same bed, ward, room, or dormitory with an advanced consumptive, and no incipient or doubtful case should be received into a ward with advanced cases. Numerous striking instances of infection are reported (*Louisville Medical News*, March 22, 1884); and the recent experiments of Cornet (*Wiener med. Wochenschrift*, November 2, 1888) show that the walls and furniture of rooms or wards often become infected by the dried sputum.

The only institutions of which I have personal knowledge which received consumptive or tuberculous patients in all stages were: First, the Philadel-

phia Hospital, of which I was a resident soon after graduation. The mortality in it was very great; none were cured, and but a few improved. We had the best advice of the day, namely, men like Dr. W. W. Gerhard and Dr. Caspar Pennock, and the only cured cases in outside practice that I can recall were the late Dr. Parrish, Sr., and Dr. Stewardson.

The second in point of time was the Royal Victoria Hospital for patients suffering from consumption and for diseases of the chest. It was situated in Victoria Park, East London, and was founded in 1848, but did not receive patients until 1855. In the years 1879 and 1880, when I visited it with Dr. Peacock, one of the visiting physicians, the average number of in-patients was between seven hundred and eight hundred. It is a strictly charitable institution, and is maintained and governed like the National Hospital for Consumptives and Diseases of the Chest, Ventnor Undercliff, in the Isle of Wight, but not like it, in that it receives patients in all stages of the disease, while the latter admits only incipient cases. Each patient is required to pay ten shillings per week. The Victoria Hospital is under the patronage of the Queen and royal family, and is supported by many and valuable gifts from wealthy Englishmen and the nobility.

In the valuable paper of the evening, it is stated that of 979 patients admitted during the year 1888, 377 were more or less relieved, and 95 died. From the time that patients were first admitted (1855) to the hospital, to December 31, 1888, there were registered 22,360. The buildings are very handsome, with every convenience and comfort—nay, elegance. Large, beautiful grounds are kept in perfect order. The nurses are intelligent and cultivated gentlewomen, and everything about the building is conducted in the most complete and perfect manner, more like a private establishment of a refined and tasteful gentleman's dwelling. Still, with it all, there was one sound which did not fail to tell the tale of the disease which, in this city alone, numbers its victims by the thousands, and in the great city of London it tens of thousands.

My connection with the Howard Hospital for over thirty years as a physician and for several years as a manager, has brought me into contact with a large number of consumptives, in most cases in the second and third stages; and I believe that they do not require a hospital so much as a home, with good food, medicine, and a little money, or, when this is not possible, a home such as the "House of Mercy," 522 Spruce Street, the upper rooms of which are fitted with every comfort and convenience as wards, and under the care of a most competent physician of long experience in the diagnosis and treatment of this class of cases. The general health of the patient is carefully considered, and good food, vocal gymnastics, fresh air, sunlight, and all the most recent remedial agents are employed. The patients are urged to eat as much as possible—overfeeding is encouraged; and beside the three regular meals, two lunches at 11 A. M. and 4 P. M., and milk on retiring are at the disposal of the sick. These means help to increase the nutrition,

and supply the waste constantly going on in those suffering with this disease. The sputa of the patient are rendered innocuous by the use of proper germicides. The ventilation of the "House of Mercy," both in summer and winter, is all that can be desired, and the absence of any offensive odor was noticed on the days of our visits. The walls, ceilings, and floors of all the rooms are painted, and at regular intervals, in rotation, they are washed and scrubbed, rendering them clean and pure. The average number in this house during the year 1888 was 44. Discharged, much improved and able to work, 2; improved, 13; no improvement, 12; died, 11; remaining over from last year, 6.

Another institution, alike creditable to the benevolence of our citizens is the Home for Consumptives at Chestnut Hill. The report of Dr. Robert Bolling, the Physician-in-charge for the year 1888, is as follows:

Number of cases received during the year, 39; remaining over from last year, 9; discharged or removed, 29; died, 10; remaining, 9. Of the discharged, 10 were so much improved as to be able, in most cases, to resume their usual occupations. Many of those who died lived only a few months after admission, and three only two or three weeks. The doctor further observes: "Though undesirable to admit those in the last stages of the disease on account of the depressing effect of their death on the survivors, I cannot fail to appreciate the feelings of happiness and contentment that such a home affords to the poor sufferers whose days are numbered, and with no one to care for them."

No fee is charged for admission to the House of Mercy or Home for Consumptives.

In place of there being large wards in the Home, each containing a great number of consumptive patients, there are small rooms, each holding only one or two patients. The location of the Home is an admirable one. It gives to the inmates abundance of fresh air, a charming view, and spacious grounds. The rooms are well lighted, with high ceilings, and well warmed and ventitilated, with sun galleries and every comfort.

Besides the consumptives cared for at the two institutions, a number are provided for in private lodgings or with their friends; these receive medical attention, proper food, and aid in money. So that the whole number of

| | | |
|---|---|---|
| Beneficiaries in the consumptive department of the City Mission on April 1, 1889 | | 37 |
| Received to March 31, 1888 | | 121 |
| | | 158 |
| Died during the year | 33 | |
| Discharged during the year | 56 | |
| Removed | 47— | 136 |
| Present number | | 22 |

On January 31, 1890, there were eleven males in the House of Mercy and eighty females in the Home for Consumptives.

This is the plan I would advocate: Reserving the hospital for only recent cases, paying in one of the cottages a small sum for board per week, say two dollars and a half, in hopes of a cure, and term it a Chest Hospital or some better name, as the New Ventnor.

During a recent visit to this institution (February 4, 1890) Dr. Bolling stated that the whole number of cases from the opening, May 17, 1886, to February 4, 1889, was 142; died, 43. Of this number, in some eight or ten the disease was arrested, even in the third stage, and they were able to devote themselves to some light employment, and live in the open air.

Dr. Flick: I shall not occupy much time in concluding this discussion. It is, of course, difficult to understand the deductions which I have made without seeing the tables. I should not have believed them had not the figures shown them beyond doubt. I have no doubt that, even if no further prophylactic measures are employed, tuberculosis will in fifty years be as rare in England as leprosy is at present. I look upon the method of contagion as almost identical with that of leprosy. The measures which have succeeded in wiping out leprosy will succeed in wiping out tuberculosis.

Dr. Cohen, in his objections to the view of contagion, made an unhappy reference in citing Italy as an illustration. Venice has one of the smallest mortality-rates from phthisis of any city in the world. All Italy, in spite of its miserable sanitary arrangements, has a very low mortality-rate from tuberculosis. It can scarcely be doubted that this low mortality is due to the old views held by the peasantry in regard to the contagiousness of the disease.

I must differ with Dr. Turnbull in regard to the importance of having homes for consumptives and not hospitals. It is for the reason that in this city we have homes and not hospitals, that better results cannot be shown. People cannot be expected to be interested in institutions for the treatment of consumption unless some chance of recovery is held out to them. The institution must bear with it the idea of treatment and recovery. If a remote hope of recovery can be held out, it will be accepted.

I trust that this subject will receive the consideration which it deserves, and that the medical profession of this city will come forward and assume the responsibility placed upon it by the present status of medical science. It is strange that nothing has been done in our large cities, while all European countries are actively working; we cannot be held excusable here.

# A STUDY OF THE PATHS OF SECONDARY DEGENERATION IN A CASE OF INJURY OF THE CERVICAL SPINE.

By ARTHUR V. MEIGS, M.D.,
PHYSICIAN TO THE PENNSYLVANIA AND CHILDREN'S HOSPITALS.

[Read March 5, 1890.]

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Although at first sight it might appear that one case of any given disease is like another, and, therefore, that isolated cases are hardly worth placing upon record, yet the one I propose to relate presented features that are not so common as to render them trite, and, at the same time, showed the incorrectness of statements which common acceptation has caused to be looked upon as facts. The subject of the results of spinal injuries has long occupied a large share of the attention of surgeons; and neurologists and anatomists have been much occupied of late in studying the upward and downward paths of the secondary degenerations which follow injuries of the spine, whether traumatic or the result of the processes of disease; for, beside the interest which always attaches to the study of pathology, it being an acknowledged fact that the more perfectly we understand the morbid processes of any disease the more competent we are to treat it, anatomists have learned that from a study of the course of the secondary degenerations they can best follow the paths of the nerve fibres from their origin in the brain to their final termination in skin, muscle, or elsewhere, according to what their special function may be.[1]

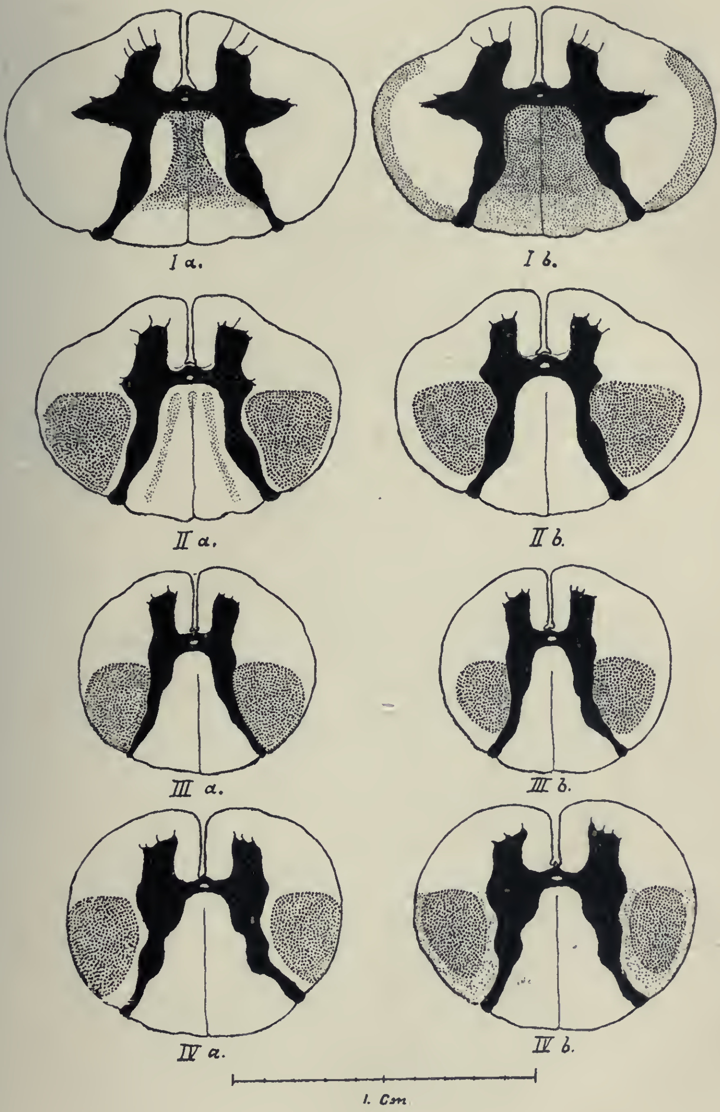
[1] My most hearty thanks are due to Dr. Packard, my colleague at the Pennsylvania Hospital, who placed the case at my disposal and under whose charge the patient was while in the ward, and to Dr. W. D. Green, the resident physician who made the post-mortem examination and prepared the history for me.

Henry B., thirty-five years of age, a sailor by occupation, and born in England, was admitted to the surgical ward of the Pennsylvania Hospital August 20, 1888, and died September 15th of the same year. During heavy weather at sea, ten days before his admission, he was struck by a wave and dashed against the bulwarks striking the back of the head and neck against the rail. It was found at once that he had lost all sensation and power of motion from the clavicles downward, and from the time of the accident he had retention of urine and incontinence of feces. When admitted to the hospital there was a large bedsore upon the back, entire loss of sensation below the clavicles, and abolition of the reflexes. Examination of the urine gave negative results. The temperature varied between 100° and $103\frac{3}{5}$° F. There were no marks of violence nor signs of fracture or luxation of the vertebræ. The treatment consisted of the administration of iodide of potassium, the use of a water-bed, and a poultice upon the chest. Even upon his admission there were some coarse mucous *râles* to be heard upon examination of the lungs, and this condition gradually increased until the lungs were full of *râles*, and he became unable to expel the mucus; abdominal tympany came on and he became comatose and died seemingly of heart-failure.

*Post-mortem* examination showed that there was neither luxation nor fracture of the spine, but a small extra-dural hemorrhage into the spinal canal at the level of the seventh cervical vertebra.

In regard to the condition of the cord it will be necessary to give some details of the methods employed for its examination and preparation for microscopical study. When first removed the dura mater was slit up upon both the anterior and posterior aspects to expose the pia and nerve-roots and the substance of the cord cut transversely at many points, the sections being made at intervals of from an inch to an inch and a half. Though it was then examined with ordinary care nothing abnormal was noticed, and it was placed in Müller's fluid for preservation and hardening. After the tissue had been a few weeks in the fluid, when removed for examination it was at once obvious that it presented marked evidence of disease. When the lower part of the cord was looked at, a fresh transverse section having been made, it was seen that the gray matter was stained of the yellow tint produced by Müller's fluid and that the greater portion of the white matter had the usual greenish color, but there was in the antero-lateral region upon both sides a large spot which was roundish

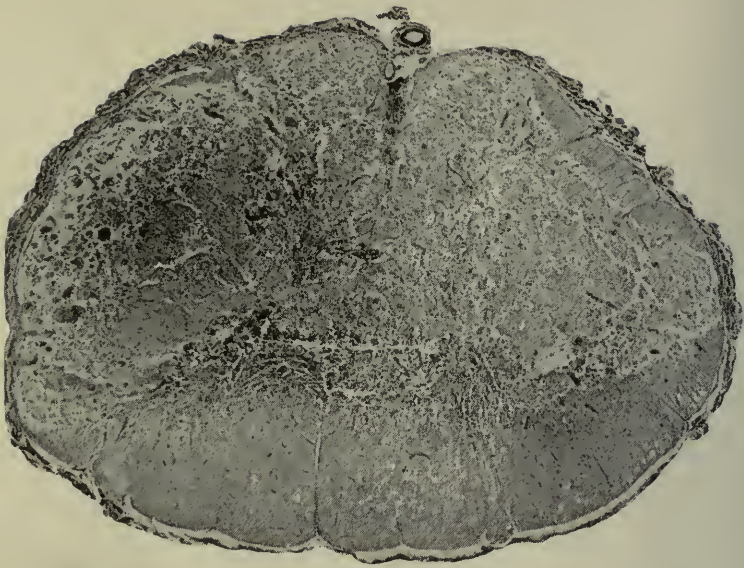
PLATE I.




× 4 diameters.

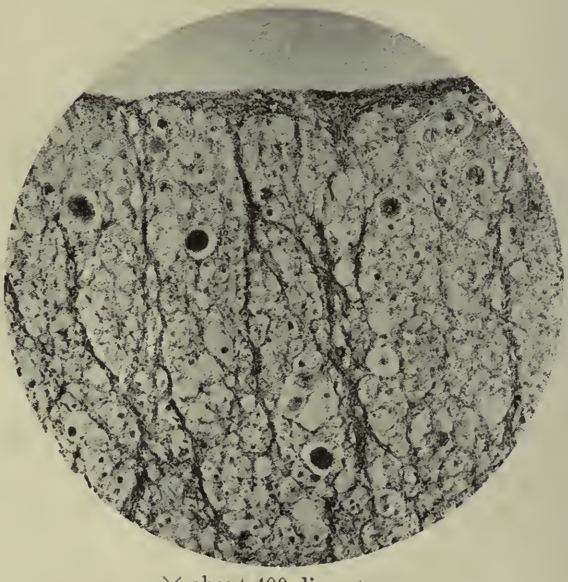
PLATE II.

FIG. 1.



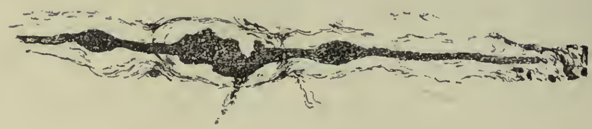
× 10 diameters.

FIG. 2.



× about 400 diameters.

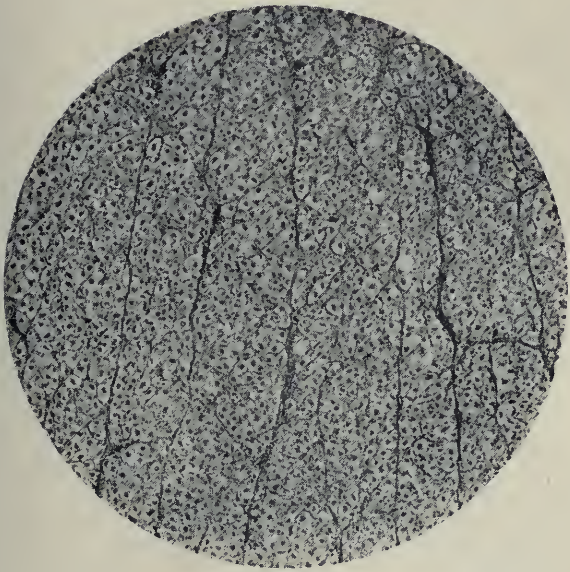
FIG. 3.



× 400. 1/10 millemeter

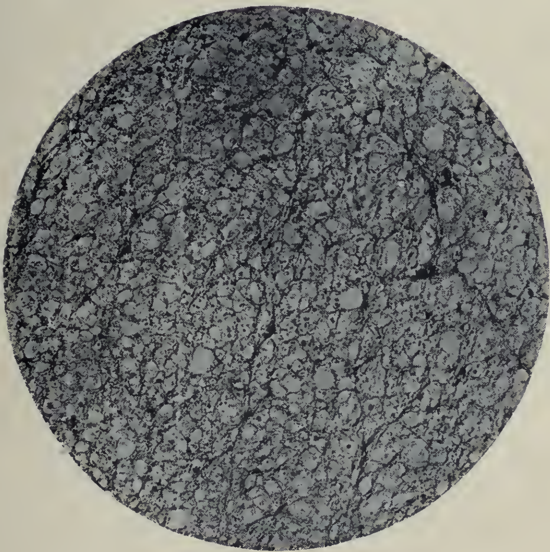
PLATE III.

Fig. 1.



× 225 diameters.

Fig. 2.



× 225 diameters.

when the cord was looked at, as already stated, in horizontal section. This area was of a yellow hue, the shade of color being as nearly as possible the same as that taken by the gray horns. Upon cutting across the cervical portion—and it must have been at about the level of the seventh vertebra, the precise relation of the parts to the vertebræ was unfortunately not preserved, the nerve substance was seen to have lost all apparent uniformity of geographical arrangement, no distinction between gray and white matter could be discovered. The cord when thus seen presented a surface somewhat rough and irregular—and was of an almost even dirty yellow color, presenting at no point the greenish shade which is taken by the white portion of normal spinal cord. At all points, the cord below this area was natural, so far as naked-eye appearances went, except for the irregularly round spot in the antero-lateral columns which was everywhere distinctly visible, extending down into the lumbar region, where it was perhaps more evident even than above, and for two comma-shaped spots of yellow in the postero-external columns (see Plate I., Fig. 2 *a*) in the upper dorsal section cut a short distance below the area of injury. Unfortunately but little of the cord above the position of disintegration was preserved, but what there was showed perfectly distinctly that the yellowish spot in the antero-lateral columns was absent, but that a portion (see Plate I, Fig. 1 *a*) of the posterior columns was of the same yellow color—thus showing ascending degeneration above the area of injury.

Pieces were taken for microscopical study from the region of destruction in the cervical portion; a short distance below this area in the upper dorsal portion; from the mid-dorsal, and from the lumbar region. Two sets of these were prepared, the one by the celloidin method and stained with Weigert's reagents, the other in paraffine and stained with carmine, and carmine and sulpho-indigotate of potash. A third set were prepared according to the method of Schultze, which has been described in the *American Monthly Microscopical Journal*, December, 1889, by Dr. George A. Piersol, who pre-

pared these sections for me—the staining material being carminate of soda. Sections were also prepared and stained by the Schultze method of a piece of the cord, a very short distance above the area of degeneration, from the cervical enlargement. Teased preparations were also made both of tissue taken directly from Müller's fluid, and, after being stained in carminate of soda and these mounted, some in glycerin and some in balsam; of portions of the antero-lateral (crossed) pyramidal tract which had been carefully dissected out, and of the anterior white substance which was still healthy, for comparison.

It will probably be best to begin the description of the histological conditions observed with the disintegrated area, and afterward to consider the secondary degenerations passing up and down the cord.

The sections were taken as nearly as can be judged from about the region of the seventh cervical vertebra. The large artery at the edge anteriorly presented some thickening of the intima, which was more marked upon one side than the other; others at the posterior surface also showed moderate increase of thickness of intima from nuclear proliferation. Veins at the posterior surface presented evidence of inflammation, and one contained a well-organized laminated clot occluding its calibre. The greater portion of the tissue of the cord itself had undergone complete disorganization, but the extent of this and its geographical distribution will be better understood by an examination of Plate II., Fig. 1 than by any description. Toward the periphery anteriorly a thin fringe of tissue remains, and posteriorly the whole of the posterior columns—except a small portion (constituting perhaps one-sixteenth to one-eighth of the area) near the commissure and quite a large area of the lateral column—upon one side are in a condition quite or nearly normal. In both these areas the nerve-fibres can be readily distinguished, and even the axis-cylinders are sharply outlined and well defined. The rest of the tissue, including thus a small part of the anterior portion of the posterior columns and much the greater part of the anterior white substance, with the whole of the gray matter, is completely

disorganized and is made up of the so-called fat-granule cells, swollen and distorted nerve-fibres, corpora amylacea, large nucleated cells staining very red with carmine, and much space, apparently empty, which was probably filled with colloid material or liquid, for if it had not been so the tissue would have collapsed instead of hardening in Müller's fluid.* At the junction of the uninjured tissue with the disintegrated portion everywhere there is a boundary layer of material, greater or less in extent, which stains very bright red with carmine, showing the condition of cell activity which is to be looked for at the periphery of areas undergoing any stage of the process of inflammation.

In order to facilitate and make clearer the description of what was observed in regard to the condition of the cord above and below the area of destruction which has been described, two sets of diagrams were made (see Plate I.). These represent, upon the one hand, the paths of degeneration as their outlines would have been described from a macroscopical examination of the tissue alone after it had been hardened in Müller's fluid—for, as has already been stated, no abnormality was noticed when the fresh cord was examined; and, upon the other, these same paths as outlined from a careful microscopical study of the state of the nerve-fibres and other elements made from very good sections cut and stained in several different ways and from teased preparations.

Sections made a short distance above the area of disintegration, which, as already stated, was at about the level of the seventh cervical vertebra, showed that the tissue was not anywhere in as good histological condition as that taken below that region and further away from the area of transverse myelitis. Though the greater part of the nerve-fibres were natural looking, there were at all portions of the cord at this level scattered fibres which were more or less degenerated. The position in which the fibres are in the best state of preservation is the lateral (crossed) pyramidal tracts. An examination of the two diagrams (Plate I.) gives the best understanding of

the apparent geographical distribution, both macroscopical and microscopical, of the paths of secondary degeneration.

It is evident that the gross appearances are very misleading, but this matter will be discussed later. Microscopical examination shows that in this particular case the whole of the posterior columns had undergone some degeneration, the greater portion, and that toward the centre lying nearest to the commissure in particular, having been almost entirely destroyed, there being hardly any normal fibres remaining, while a rather narrow band at the posterior edge showed only a partial destruction of the tissue—it consisting of nerves whose outlines were sharp and distinct—and many others showing partial destruction of the axis cylinders, some of these being swollen or fatty, or, again, very granular looking and stained intensely red with carmine. Some of these latter were undoubtedly axis cylinders, swollen, disintegrated, and inflamed, for in preparations that had been stained with carminate of soda and then teased out into shreds (see Plate II., Fig. 3) many nerve-fibres could be seen in which the axis cylinders were very red, distorted to all sorts of shapes, and granular. In places the irregular swellings were so great as to be as large as the diameter of the myelin sheath.

Toward the inner sides of the lateral (crossed) pyramidal tracts the areas of degeneration abutted directly against the posterior gray cornua, there being positively no band of healthy or even partially healthy tissue separating them.

In the anterior white columns, extending around at the periphery from the posterior gray cornua well toward the anterior, and involving the whole of the direct cerebellar tracts and what Gowers describes as the antero-lateral ascending tracts, were upon either side belts of tissue which had undergone partial degeneration, the degree of change being about the same as that of the most posterior part of the posterior columns. The area occupied by the degeneration can be better understood from an examination of the diagram (Plate I.) than by any description. Almost directly opposite the lateral branch of the anterior gray cornua upon one side, the red

stained spots that have been mentioned were larger and more numerous than anywhere else—their appearance is well represented in Plate II., Fig. 2,—and the teased preparation (Plate II., Fig. 3) proves that they are changed axis cylinders.

In the gray matter some of the large multipolar cells were seen to be round and granular in appearance and no branches could be seen, nor nuclei; while others, again, were sharp in outline, the nuclei distinct, and several branches remained attached to them. Whether these appearances were due to disease or not cannot be positively stated.

In the sections from the upper dorsal cord a short distance below the area of transverse myelitis, and in those from the mid-dorsal and lumbar portions, the degeneration in the lateral (crossed) pyramidal tracts was very evident, and its appearance, as compared with the healthy tissue from the anterior portion, is most graphically shown in Plate III. The nerve-fibres are swollen, in many instances the axis cylinders having disappeared, or, again, they are distorted and irregular in outline, and a very marked feature is the overgrowth and increase of the neuroglia, which has, at the same time, lost much of its regularity of arrangement.

The strands seem to be irregularly thick, have lost their sharpness of outline, and no longer present the natural appearance of running in a regular radial manner inward from the pia mater from which they start. The diagrams (Plate I.) show better the areas of degeneration than any verbal description. It may be seen how different are the impressions of the geographical distribution of these areas to be derived from the microscopical and macroscopical appearances, which latter are very misleading. The large comma-shaped spots in the posterior columns in the sections taken from the upper dorsal portion do not appear upon microscopical examination as areas of degeneration at all, the only change which corresponds being a distinct, but not very great, increase of thickness of the neuroglia, which is stained very red by carmine, and a separation of the fibres as if by effusion. A noticeable feature is, that in all the sections taken from below the area of destruc-

tion—to a slight degree in those from the upper dorsal region and markedly in the mid-dorsal and lumbar regions—the nerve-fibres in the posterior columns toward the commissure, though in a good state of preservation, are very much separated as though by the effusion of some fluid or colloid material. This could not have been the result of any faulty technique, as it is plainly to be seen in sections prepared in three entirely different ways. In several of these sections cut below the area of transverse myelitis, there was a strong suspicion of the existence of slight degeneration in the anterior (direct) pyramidal tracts, but it was not absolutely certain, and, therefore, not figured in any of the diagrams. With reference to the extent of the degeneration of the lateral pyramidal tracts, an examination of the diagrams shows that, as their geographical relation was determined by microscopical study in the sections from the upper dorsal region, the direct cerebellar tracts were left untouched, and a little more than is commonly described as belonging to this region, for the bands of healthy tissue at the periphery extended well back to the posterior gray cornua, the degenerated matter nowhere coming in contact with the enveloping pia mater, while at the inner side the degeneration extended flatly up against the posterior gray cornua, leaving no healthy tissue in what is described by Gowers as the lateral limiting layers. In sections from the mid-dorsal region the areas of degeneration were closely parallel to those last described. In the lumbar region, however, the conditions differed markedly (see Plate I., Figs. 4 *a* and 4 *b*), both from those found in sections taken from portions of the cord above and from the macroscopical appearances. The areas of total degeneration were separated from both the periphery and the posterior gray cornua by bands in which some slight change had taken place, but in which the greater part of the fibres were still in a good state of preservation. The spinal nerves, where any of them are included in the sections, exhibit marked degeneration; the degree of this is greater in the sections from the lumbar and mid-dorsal regions than in those from the upper dorsal, though still unmistakable

in the latter area. There are also large clear spaces between the bundles of fibres where the bloodvessels lie, as though there had been distention of the lymph sheaths. The character of degeneration of these nerves presents a marked contrast with that in the cord itself, looking as though a mere shrinkage and wasting of the tissue had occurred as a consequence of disuse, very different from what is seen in the cord, which exhibits all the appearances of a more or less active inflammation—in brief, the one looks as if it was a secondary and remote consequence of something that had occurred far away, the other like an active process going on where it is seen. A marked feature in the sections taken from these three regions below the area of transverse myelitis is, that the columns of degeneration in the lateral pyramidal tracts in the lumbar sections cover a much larger area than they do in the mid-dorsal, and fully as large as in the upper dorsal, this being contrary to what is said commonly to occur—that the areas of degeneration became progressively less as the region of original injury becomes more distant.

Peculiar interest, perhaps, attaches to this case, in that the use of the Schultze method of staining made it possible to study the paths of degeneration and their precise degree and geographical outlines with much more precision than would have been possible by older methods. The Weigert method and very good paraffine preparations stained with carmine, and carmine and sulpho-indigotate of potash, gave results far inferior to those obtained with the Schultze stain, carminate of soda.

The degree of degeneration was slight as compared with that commonly found in long-standing cases of tabes or other forms of spinal sclerosis, which the Weigert method demonstrates so beautifully. The Weigert method, so far as the study of transverse sections of the white substance of the spinal cord is concerned, depends upon the black or bluish-black color taken by the myelin sheaths, and this prevents in healthy tissue any accurate study of the state of the axis cylinders, which are so closely surrounded by the dark-colored

material that their outlines are not distinct. In old cases of spinal sclerosis the myelin, as well as the axis cylinders, has disappeared or undergone so much change as to be no longer capable of giving the characteristic color; and, therefore, the method demonstrates most graphically the degenerated areas. In this case, though, the degenerative processes had not progressed so far, the man having lived about five weeks only after his injury, and the changes had taken place principally in the axis cylinders, leaving the myelin still in sufficiently good condition to take the characteristic color; and therefore, though the changes were sufficiently great for the Weigert method to show their presence plainly, it entirely failed to reveal the geographical outlines and extent, as shown by the other preparations.

The question whether these secondary degenerations of the cord are inflammatory, is one which it would seem possible only to answer in the affirmative, if the definition of Burden Sanderson of what constitutes inflammation be received. In his classical article,[1] he defines it as follows; "By the 'process of inflammation' I understand the succession of changes which occurs in a living tissue when it is injured, provided that the injury is not of such a degree as at once to destroy its structure and vitality. With reference to their origin, all inflammations may be comprised in two classes—extrinsic and intrinsic."

This definition is very comprehensive, and would seem to be as good a one as the subject to be defined admits of; the prime difficulty, however, remains—which is, to decide in individual instances among the very long "succession of changes" which occurs, often extending in an unbroken line to regions far remote from the original seat of injury; at what point precisely to draw the line, and say, upon one side the changes are truly inflammatory, and on the other are secondary and non-inflammatory. Certainly no one would pretend to call paralysis of a limb an inflammation, though caused directly by some

[1] Holmes's Surgery, vol. v., page 729.

inflammation of the spine which produced at the original seat effects the inflammatory character of which no one would pretend to deny. In the individual case being dealt with, a careful examination of the nature of the changes which occurred seems to make it sufficiently clear that those in the spine itself were truly a part of the process of inflammation, while those outside of this tissue, beginning therefore with the spinal nerves, were secondary, and would be more correctly described as atrophic than inflammatory.

The difference of the appearances in the two positions is most striking, in the spine the axis cylinders and sheaths being greatly and irregularly swollen (see Plates), as though from an active inflammatory process extending upward and downward from the original seat of injury throughout the cord, while the spinal nerves, when changed at all, are shrunken so as to be much reduced in size—as though they were merely dried up from disuse—none of the commonly accepted signs of inflammation being present. The process of change was an unbroken one, beginning at the seat of original injury as an active inflammation and extending upward—how far, unfortunately, cannot be known, as the condition of the brain was not studied—and downward through the cord to the spinal nerves, and doubtless much further if it had been sought for, with lessening intensity until it ceased to be any longer properly named an inflammation, but became an atrophy.

The fact is a curious one—and its cause will probably be learned in the future, perhaps from a careful study and fuller understanding of the circulation in the parts—that the change from inflammation to atrophy is quite abrupt, and that the line is at the point of separation of nerve from cord.

It will not be amiss once more to call attention to Plate II., Figs. 2 and 3, showing, as they do, such very great swelling of the axis cylinders, and to recall to attention the fact that no condition in any wise parallel to this was found in the spinal nerves, which, although in the nature of things, they must have undergone their changes later than those in the cord, exhibited only alteration which could be described as atrophic;

and to emphasize the conclusion, which would seem a necessary one, that the so-called secondary degenerations of the spinal cord are in truth more correctly to be described as direct extensions of inflammation.

What part of the changes at the seat of injury was due to the direct effect of the blow producing rupture, hemorrhage, and immediate destruction of the tissue, and how much to the disturbance of the circulation and consequent failure of nutrition, it is quite impossible to say, but it would seem certain that the disintegration instantaneously produced must have been very great, for there was absolute loss of function, as evidenced by the complete loss of sensation and motion from the instant that the blow was received.

So far as the ascending and descending secondary degenerations are concerned, a study of their geographical relations and extent—and a very correct understanding of these may be had from the diagrams—brings to light several features of interest. It may be premised that, though the paralysis was absolute from the reception of the injury, the transverse myelitis was not; a large part of the posterior columns was structurally little, or not at all, injured, and two bands of tissue in the anterior white substance (see Plate II., Fig. 1) also were made up of nerve-fibres natural in appearance. A most important point which the study of this case demonstrates is, that any deductions drawn from an examination of the macroscopic appearances alone would lead to very false conclusions with regard to the paths and extent of the secondary degeneration, though the naked-eye appearances of disease were so manifest, after the tissue had been in Müller's fluid, that they could not have been overlooked by anyone. It is in the highest degree likely—nay, almost certain—that in the past erroneous conclusions in regard to the paths of degeneration have been recorded, owing to observers having trusted to the gross appearances alone, and to the fact that by older methods of preparation and staining it was almost impossible to obtain sections which would show the condition of all the nerve-fibres throughout whole sections down to the minutest details, as by

Schultze's method. Beyond question, it is difficult, or even impossible in some instances, to determine the presence or absence of disease by a naked-eye examination alone of fresh spinal cord. Soaking in Müller's fluid for a week or too will very likely bring to light diseased appearances which cannot fail to be recognized, but the study of this case demonstrates that, if the color-changes thus produced be exclusively relied upon, and it be concluded that all areas are degenerated in which the white substance stains of a yellow color instead of the greenish hue generally taken by healthy white matter, and that all parts taking the greenish tinge are healthy, a grave error will be made. The diagrams (Plate I.) show, upon the one hand, the outlines of the yellow-staining spots in the white substance drawn from a naked-eye examination, and, upon the other, the actual areas occupied by degenerated nerve-fibres; the appearances presented, as is readily seen, do not by any means correspond. In the sections from the cervical swelling above the myelitis area (Plate I., Figs. 1 *a* and 1 *b*), the whole of the posterior columns was more or less degenerated, a narrow band at the peripheral portion being slightly so, while that toward the centre had undergone complete disintegration, very few axis cylinders being distinguishable. This is, perhaps, no more than might have been looked for, as the section was cut so short a distance above the region of almost total destruction, and if other sections could have been had from regions still higher, it is likely that the degeneration might have been found confined to the postero-median (Goll's) column, as is said usually to take place.

The degeneration of the whole of the direct cerebellar tracts, and of a portion, at least, of the antero-lateral ascending tracts (as described by Gowers), is what usually occurs in ascending degeneration, and, as has already been said, it was in about the area of junction of these two tracts that were found the largest number of the greatly-swollen axis cylinders; the disease-process seeming here to be very fresh and active.

The diagram Plate I., Fig. 1 *a* represents the area of

degeneration, as shown by macroscopic examination alone, and it may be seen that it is misleading, as it makes it appear that there was no degeneration of the posterior portion of the posterior columns at all, and none of the anterior part of the postero-external, nor any of the direct cerebellar or antero-lateral ascending tracts.

Figs. 2 *a* and 2 *b* represent the appearances, macroscopical and from microscopic examination, below the region of destruction, being of the upper dorsal region. This, as represented in Fig. 2 *b*, shows that the degeneration was of the lateral pyramidal tracts and lateral limiting layers alone. The appearances, as studied macroscopically, are very different—it would seem as if (Plate I., Fig. 2 *a*) the lateral limiting layers had remained healthy, while the greater portion of the direct cerebellar tracts appeared to be involved by the degenerative process; further, there appeared two comma-shaped spots in the postero-external columns, which microscopic examination failed to demonstrate at all—the only change, as has already been stated, that was found in this area being a general separation of the nerve-fibres, as though by some effusion and overgrowth of the neuroglia. This comma-shaped downward degeneration is alluded to and figured by Gowers,[1] but by him is represented as being of much less extent than in my case. It is very strange, and at present inexplicable, that it should have appeared merely as a color change and that no degeneration of the fibres should have been found, but only a separation and connective tissue increase.

Plate I., Figs. 3 *a* and 3 *b* show that though macroscopically it appeared as if the columns of degeneration extended externally directly up to the periphery, microscopic examination showed quite a wide band of tissue (the direct cerebellar tracts) which had remained healthy; the lateral limiting layers were involved.

In Plate I., Figs. 4 *a* and 4 *b*, quite a different appearance is presented: macroscopically, the degeneration seemed to extend

[1] Diseases of the Nervous System, vol. i., pages 118 and 120.

to the periphery, but to leave the lateral limiting layer healthy; microscopic examination showed that the degeneration in truth occupied the whole area outside the posterior horns, but that at the centre it was great in degree, while the lateral limiting layers and direct cerebellar tracts, though degenerated, were so in a less degree. It is curious that nowhere was there any positive descending degeneration of the direct pyramidal tracts, though some of the sections presented appearances suspiciously like it, and, contrary to what is stated to be the usual condition, the degeneration in the lateral (crossed) pyramidal tracts did not become less in extent from above downward as the distance from the seat of injury became greater. On the contrary, the degenerated areas in the lumbar sections, besides being as large as they were higher up the cord, presented, if anything, a still greater degree of overgrowth of the neuroglia. It is worthy of note that sections prepared by the Weigert method, though they exhibited distinctly the presence of degeneration, did not outline its extent nor show the histological condition of the component parts very satisfactorily. This was probably due to the fact that it produces its effect by staining the nerve sheaths of a more or less dark color, thus necessarily concealing, to a greater or less extent, the outlines of the axis cylinders.

In conclusion, it may be well to summarize the points of interest of the case, and to emphasize the lessons it teaches.

*First.* The use of the Schultze method of staining in addition to the older ones rendered possible a closer study and more complete understanding of the disease than could otherwise have been had.

*Second.* The suggestion that the changes in the cord would be more properly described as inflammatory than atrophic, as they are usually called, is worthy of notice and consideration. The condition of the bloodvessels described in the sections from the area of transverse myelitis and that of the connective tissue elements would seem to bear this out.

*Third.* The enormous size of the axis cylinders, greatest in the antero-lateral ascending tracts above the area of myelitis

—a thing the Weigert method did not reveal and which was only made plain by the Schultze stain—would seem to be one of the earliest changes to take place, the white substance of Schwann remaining apparently unaltered and the large axis cylinders being in the midst of nerve-fibres apparently healthy.

*Fourth.* The question is an interesting one, and at present entirely unanswerable: What portion of the changes at the area of myelitis was at once produced by the original violence, and how much came on afterward as a consequence of the hemorrhage and disturbance of the circulation and consequent failure of nutrition?

*Fifth.* The separation of the nerve-fibres in the posterior columns, apparently from interstitial effusion, is curious and worthy of attention. There can be no doubt, either, of its existence below the area of injury throughout the dorsal and in the lumbar cord, for it was plainly evident in sections prepared in three different ways, and cannot, therefore, justly be attributed to any fault in technique.

*Sixth.* It is worthy of reiteration that the columns of degeneration, contrary to what seems to be universally accepted as always the case, did not become smaller from above downward, for they were larger in the sections from the lumbar than from the mid-dorsal region.

*Seventh.* The fact that the actual paths of degeneration, as outlined by careful study of the microscopical condition of the tissue, were so different from the areas occupied by the color-changes, the only guide to their understanding macroscopically, is a most important one.

*Eighth.* It is noticeable, too, that the paths of degeneration do not occupy and confine themselves strictly to the areas usually described. This proves either that the ordinary descriptions are somewhat incorrect, or that there is much variability of each case from every other one.

*Ninth.* The absence of any degeneration of the nerve-fibres in the areas occupied by the comma-shaped yellow spots in

the sections from the upper dorsal region is not easy to explain.

*Tenth.* In considering the paths of upward degeneration it is curious that the whole of the posterior columns should have been involved, when it is recollected that in the region of greatest destruction, the posterior columns were the portion in the best state of preservation, the nerve-fibres being destroyed only in a very small portion of the front part. This does not tally very well with the doctrine that the change is a degenerative one, and that the disease creeps along the nerve-fibres in the direction of their function.

*Eleventh.* From the surgical aspect the case is interesting, especially in connection with the question of railway injuries, as demonstrating how complete may be the destruction of the nerve tissues without any bone lesion whatever, whether luxation or fracture.

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## DESCRIPTION OF PLATES.

Plate I., × 4 diameters. In Figs. 1, 2, 3, 4 *a* the areas covered with dots are the degenerated regions as determined from macroscopical examination alone, the dotted areas being the portions of the white matter which had a yellowish color, instead of green like the healthy portion of the white matter. On the other hand, and in strong contrast, Figs. 1, 2, 3, 4 *b* represent the true areas of degeneration as determined by careful microscopical examination of sections.

Fig. 1 *a*. Cervical portion, above the area of transverse myelitis. The dotted area represents the ascending degeneration as determined by the color changes produced after soaking in Müller's fluid. It occupies the posterior columns alone, and of them leaves untouched the whole of the posterior portion next the periphery, and most of the anterior portion of the postero-external columns.

Fig. 1 *b*. Same region as Fig. 1 *a*, but the dotted areas here represent the ascending degeneration as outlined by careful microscopical study of sections. The heavier dots represent much degenerated regions, the lighter dots those less so. The whole of the posterior columns is degenerated, the anterior portion more so than the posterior, and degeneration extends around at the sides in the antero-lateral columns, occupying the regions called the direct cerebellar and the antero-lateral ascending tracts.

Fig. 2 *a*. Upper dorsal portion, below the area of transverse myelitis. The dotted portions are the regions of descending degeneration as outlined from the gross appearances after soaking in Müller's fluid. There are the comma-shaped spots in the posterior columns and degeneration of the crossed pyramidal tracts. The macroscopic examination made it appear that the lateral limiting layers were not involved, while the degeneration did occupy all, or nearly all, of the direct cerebellar tracts.

Fig. 2 *b*. Same region as Fig. 2 *a*, but the dotted areas representing the descending degeneration as determined by microscopical study of sections. The crossed pyramidal tracts involved together with the lateral limiting layers, while the direct cerebellar tracts are free from change. No degeneration of the posterior columns.

Fig. 3 *a*. Mid-dorsal region. The descending degeneration here as outlined from the gross appearances seems to occupy the crossed pyramidal tracts and to extend flatly up against both the periphery and the posterior gray horns, occupying, therefore, both the lateral limiting layers and the direct cerebellar tracts, if the latter extend so far posteriorly in this region.

Fig. 3 *b*. Same region as Fig. 3 *a*. The descending degeneration as mapped out from microscopical examination. It exists in the crossed pyramidal tracts and lateral limiting layers alone. As there is a wide portion of healthy tissue between the column of degeneration and the periphery, the direct cerebellar tract is certainly not involved.

Fig. 4 *a*. Lumbar region. The degeneration here, as determined from examination of the color changes, seems to occupy the crossed pyramidal tracts and to extend quite up to the periphery externally, but to leave the lateral limiting layers uninvolved.

Fig. 4 *b*. Same region as Fig. 4 *a*. The descending degeneration as outlined from microscopical examination. There is here a central column of greatly degenerated tissue (represented by the heavier dots) surrounded at both sides and posteriorly by a less degenerated portion (represented by the lighter dots), which fills up the whole of that portion of the antero-lateral white substance lying between the periphery externally and the posterior horns internally. This column of degeneration is much more extensive than is the one in the dorsal region (see Fig. 3 *b*).

## Plate II.

Fig. 1, × 10 diameters, stained with borax carmine. The region of transverse myelitis. The tissue almost all destroyed except about half of the posterior portion of the posterior columns and a band of the antero-lateral white substance at the posterior edge, and a still narrower one at the anterior edge upon the right hand in the picture.

Fig. 2, × about 400 diameters, stained with carminate of soda. Taken from the cervical portion above the region of transverse myelitis. The picture shows greatly swollen axis cylinders (the large black spots), and was taken from

the antero-lateral white column near the periphery of the cord at about the junction of the direct cerebellar tract with the antero-lateral ascending tract.

Fig. 3, × 400 diameters, stained with carminate of soda, and the tissue teased to isolate single nerve-fibres. The picture shows a nerve sheath and axis cylinder, the latter irregularly swollen and granular in appearance. This was from the crossed pyramidal tract in the upper dorsal portion of the cord.

### Plate III.

Fig. 1, × 225 diameters, stained with carminate of soda. This picture was taken from the anterior region (the anterior ground fibres) of a section of the upper dorsal portion of the cord, and shows the typically healthy appearance of the nerve-fibres and connective tissue.

Fig. 2, × 225 diameters, stained with carminate of soda. From the same section as Fig. 1, but a picture of the crossed pyramidal tract showing descending degeneration in a high degree of development. The axis cylinders have in most places disappeared, and the arrangement of the connective tissue is distorted, having lost its radiating appearance. The contrast between these two pictures, which were taken from different regions of the same section, is a most striking demonstration of the more obvious differences in appearance between the healthy and diseased portions of tissue.

The pictures were all made by photographic process, and without retouching, from beautiful negatives made directly from the sections by Dr. George A. Piersol, except the diagrams (Plate I.) which was drawn by Dr. B. A. Randall, and Fig. 3, Plate II., which is a pen-sketch by Dr. Allen J. Smith. Without the assistance of these gentlemen to represent graphically what cannot be adequately described in words, my paper would have been almost valueless.

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## DISCUSSION.

Dr. Wharton Sinkler: I have heard this paper with a great deal of interest. It is one of great value, as are all studies and researches in regard to the pathological changes taking place in the cord, especially when we consider that nearly all our recent advances in our anatomical knowledge of the cord has arisen from a study of pathological changes in it. In the sixth edition of Dr. Hammond's work, published only little more than ten years ago, it is stated, in regard to a large portion of the white matter of the cord, that its anatomy and pathology are unknown. It is only in the past few years that what we now know of these regions of the cord has been discovered. The areas of degeneration shown in this case are not absolutely in accord with those hitherto described, but, in the main, they are. We can understand why, if there was an inflammatory condition, these degenerated

areas in the crossed pyramidal tracts may have become larger as we depart from the seat of injury, instead of becoming smaller, as other observers have stated.

There are certain practical points of interest in connection with this case. One is in regard to the gross appearances. When the cord was exposed there was no unusual appearance of the spinal cord, although such extreme degeneration was found to have taken place on making a section. This is of importance in connection with operations upon the spinal cord. When the laminæ have been removed, it is sometimes impossible to say whether or not the cord presents a normal appearance.

Another practical point is the absolute failure that would have followed an operation in this case. In the light of other experiences, there was certainly a great temptation to operation to determine whether there was any pressure from displacement of the vertebræ. In many cases where operation has afforded good results, there have been no more evidences of pressure than were present in this case.

The absence of all the reflexes is interesting and rather difficult to understand. It would have been of value to have had the reflexes more carefully studied. There is no mention made whether or not the reflexes were studied with the aid of reinforcement. In some cases where the tendon reflexes are absent, they may be developed by reinforcement.

Dr. Francis Dercum: This case is certainly thoroughly worked up, and is exceedingly interesting. I am inclined to think that the difference in results from those ordinarily found may be due to the fact that the primary lesion was a very gross one, and one in which all the structures at the seat of injury were more or less involved. There was distinct inflammation, and this may account for the increased size of the lateral tracts in the lumbar cord. Another thing is the appearance of nerve-fibre in teased preparations. I understood the operator to state that the axis cylinders changed early. In the classical experiments of Ranvier the axis cylinders were the last to change. This subject is, of course, still open, and there is a great field, especially in the study of secondary degeneration after apoplexy, in which to determine whether or not diminution of the degenerated area increases the further we go down the cord.

# ELECTRICITY IN CHRONIC PELVIC INFLAMMATORY DISEASES.

By J. M. BALDY, M.D.

[Read March 5, 1890.]

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It is now some years since Apostoli began to treat inflammatory diseases of the pelvis with electricity. At first, under the influence of the older pathology, or, more correctly, lack of pathology, he called these troubles *phlegmon*, *peri-metritis*, *para-metritis*, *cellulitis*, and by other familiar misnomers.

To-day he recognizes these same diseases under more correct names, and says he shall speak no more of peri-metritis, but of salpingo-ovaritis, whether complicating a pelvic peritonitis or not. In order that we may be sure that we are not discussing one condition of pelvic disease and Apostoli another, it may be well in the beginning to make ourselves perfectly clear on this subject. In the *Journal of the American Medical Association*, July 27, 1889, Apostoli says:

> "Every salpingo-ovaritis will generally be suitable for the appropriate electrical treatment, and this should be the conservative method of choice; it is sovereign in catarrhal salpingitis, only calmative in tubercular salpingo-ovaritis, and in certain pus tubes may be of great service."

The only variety of salpingo-ovaritis I here wish to discuss is that which I presume he intends his catarrhal salpingitis to represent, for the reason that a pus tube, with the pus drained away, practically resolves itself into an advanced stage of this variety, and, therefore, need not be separately considered. A typical picture of the pathological condition (brought about in

several ways) which I have in mind, is as follows: The Fallopian tube thickened and enlarged to two, three, or four times its natural size by inflammatory changes; the tubes cheesy or not as circumstances determine; the fimbriated end destroyed, all traces of the fimbria having disappeared, and a rounded smooth surface presenting in their place, most often with the ovary adherent to it; the ovary and tube displaced to a greater or less degree, generally and firmly adherent; as a rule, the tube is empty. With this condition the patient will present a history of sterility, pain, and general ill-health. A local examination will show, often only to an experienced finger, an enlarged tube going off from one or both sides of the uterine cornua. Sometimes the disease is easily made out by vaginal examination, at other times it is extremely difficult to detect, this difference depending on the amount of disease, the high or low attachment of the appendages, the amount of relaxation of the abdominal and pelvic tissues, and the amount of pain, actual or hysterical, experienced by the patient. That this is one of the conditions treated by Apostoli is evident from his own words:

> "It (the electrical treatment) should be continued until the patient pronounces herself cured of her symptoms, and until an examination has satisfied us that the anatomical change is considerable."

He distinctly excludes pyosalpinx and hydrosalpinx in this connection, and dictates that "surgical interference should never be resorted to until after all electrical resources have been exhausted." This is an additional proof that we are considering the same conditions, as no true surgeon attempts, excepting under rare circumstances, to interfere surgically unless the tube is destroyed. So we may consider that Apostoli has in mind just such cases as I have described, when he claims to relieve salpingo-ovaritis. In no part of the numerous contributions of Apostoli can I find that he distinctly claims to remove the organic lesions of a chronic salpingitis, and if any inference may be drawn from expressions bearing indirectly on this point, they are, that he does not pretend to accomplish this much. For instance, in the paper already quoted he cites

"two typical cases." The first was under constant treatment for one year or more, the second for over five months. The history and examination of both cases showed that the patients were suffering from pelvic peritonitis, and that behind the peritonitis there existed diseased appendages, such as we are considering. Although he claims these cases as cures, at the end of the treatment in the first case:

"A deep exploration caused rather acute pain in Douglas's pouch. . . . The uterus was found to be slightly adherent to the sacrum. With a deep touch the right ovary could be felt, also the right Fallopian tube."

In the second case:

"On pressure, a slight ovarian pain in the left iliac region was observed; the uterus was normal, very movable laterally, but it could not be lifted without difficulty, on account of the posterior adhesive bands; some prolapse of the annexes, more pronounced on the left, with one tube in the recto-vaginal wall; no signs of salpingo-ovaritis."

From this comment, "no signs of salpingo-ovaritis," it will be clearly seen that Apostoli meant that he had cured the symptoms; that he did not remove the disease will be perfectly evident to any practical surgeon from the description of the local condition at the time of the patient's discharge, presumably cured.

The disciples of Apostoli are not satisfied to accept this ground as the limit of the possibilities of the electrical treatment of these inflammatory diseases, but out-Herod Herod, and make claims which they have utterly failed to substantiate.

Goelet, in a lecture on electricity in gynecology, delivered before the class of the New York Polyclinic (*The Medical News*, June 22, 1889), says:

"That in the treatment of these conditions he finds that *exudations and adhesions melt away like ice under the rays of the sun*."

Massey in his book on *Electricity in Diseases of Women*, p. 160, says:

"Whenever chronic enlargement exists, a shrinkage to the normal size is an invariable record, and adhesions as well as exudations are generally noted as disappearing."

Lapthorn Smith (*American Journal of Obstetrics*, August, 1889, p. 805) says:

"Those who operate for this condition tell us that they frequently find the ovaries and tubes compressed and bound down by a retracting plastic effusion; but owing to the stimulation of absorption, these exudations are removed and the ovary is left free."

Many other electricians write in much the same strain. Now it is just this difference between Apostoli and his disciples to which I desire to call attention. Apostoli is by all odds nearest the truth, but even he has gone a little too far, and will undoubtedly in time modify some of his statements. My own position on this subject is quite clear, and is based on a large clinical experience, a by no means small surgical experience, and by a most careful observation for two years or more of the electrician's work in these diseases. By this I mean that I have daily, during that time, stood by the side of experienced electricians, examined the cases when they first came for treatment, examining the patients during its continuance and to the end, and have seen many of them at varying times after they had been pronounced cured or had ceased to come for treatment. In all this time I have failed to observe a single cure of the disease. By this I do not wish to be understood as saying that I have not seen patients relieved of their symptoms and sufferings, for such a statement would not be true. I have observed a number of cases after a protracted course of treatment, during which some of them were at times much worse, become so much better as to express themselves as satisfied with the results; and yet they almost invariably returned with a relapse, or I would accidentally stumble across them in some other clinic seeking if they might not obtain the cure they had failed to obtain from electricity. Again, I have seen patients made worse during and by the treatment, and have on several occasions become cognizant of some of them who have been confined to bed for a week or more with an attack of peritonitis. I have in mind one recent case, who, after three months' treatment, and during the continuance of the treatment, became so afflicted. She came

from her bed to me for relief, and refused to go back to electricity. She will be operated on shortly. I could add a dozen or more cases who have absolutely refused to try the remedy a second time.

I will not burden my paper with a detailed account of a number of cases, but will satisfy myself with the full account of one case. I think I shall, with it, be able to bring out all the essential points and prove by it as much as could be done by many such. I have selected this case from a large number of similar failures which have come under my observation—

1. Because it so well represents the class of cases under discussion.

2. Because the treatment extended over so great a length of time (sixteen and one-half months), and the operation was not made until the electricians admitted they could not cure her.

3. Because she was treated by Dr. Massey himself, a gentleman who is quoted as an expert in this method of treatment, and therefore the failure cannot be attributed to a faulty application.

4. Because we can so accurately study the different steps of the disease and treatment during its course, and have been enabled to verify all our conclusions, and demonstrate the results with the specimens in our hands.

The case stands as an excellent type of all its kind, and the results of treatment of the kind will always be the same. The cases quoted from Apostoli's paper will be found to result in the same manner if they are followed up.

In Dr. Massey's book on *Electricity in the Diseases of Women* (Case XVI., pp. 161, 162) the case to which I would direct your attention is reported, and in order that I may not be tempted to exaggerate the patient's symptoms, I will quote the report verbatim:

"E. C., aged twenty-six years, married, a native of Poland, was referred by Dr. Bradford, Sept. 27, 1888. She had had three children and one miscarriage, the last pregnancy four years ago, since which time she had been in continuous pain, and had grown progressively worse. For the last four weeks she had been particularly bad, a sanguineous discharge having been

constant. There is absolute dyspareunia, and any jar causes intense pain. Menstruation has been regular, normal in amount, attended with severe exacerbations of pain, followed by scanty yellow leucorrhœa. Examination showed uterus enlarged, somewhat anteflexed, and with fundus displaced to the right. Sound enters three inches with difficulty, producing excruciating pain. To the left of the fundus a mass is made out, consisting, apparently, of the ovary bound down by adhesions. The patient's physiognomy indicated intense suffering at every step."

From September 27th until November 13th, a period of about a month and a half, this patient was treated with electricity. Her condition at the end of that time is noted in the above quoted book (p. 163) as follows:

"Uterus measures two and a half inches, with fundus somewhat to right. The mass to the left is scarcely discernible, and the ovary can be detected higher up. Still under treatment."

In a letter written by Dr. Massey, in answer to a criticism on his book, in the *Annals of Gynecology*, August, 1889 (p. 528), he again referred to this case, and I here reproduce what he said at that time (eight months after the first report of the case); the case having in the meantime been under constant treatment:

"The critics' oracular statement, 'that any attempt to melt away pelvic adhesions and indurations, other than simple congestion,' by electricity, 'is futile and harmful,' is somewhat wide of the mark. No one attempts to melt these adhesions by the direct polar action of the current as they evidently suppose. The methods adopted include the morbid products within the interpolar zone of a galvanic current, and by cataphoric action promote their absorption. This treatment is necessarily tedious in many cases, but, if faithfully pursued, will lead often to most brilliant results. The ultimate result in Case XVI., in which there was a prolapsed ovary surrounded by exquisitely sensitive adhesions and indurations of four years' duration, is an excellent illustration of this fact, but was not related in the work, as the patient was still under treatment at the date of going to press. This patient had declined operation at the hands of one of the critics, and during the electrical treatment at the Pennsylvania Hospital was repeatedly examined by competent surgeons, who predicted failure. She has now been in the enjoyment of perfect health for some months, discharging fully all duties to her husband and children, even to doing the family washing. This case deserves particular mention, as it was the subject of sceptical criticisms at one of the medical societies while the treatment was in progress."

Within a few weeks after the above report the patient was back with a return of all her old troubles. After some weeks' treatment she was again discharged as cured, only to return in a short time as bad as ever. In the next few months she had periodical relapses, of which she was relieved at times by electricity, at other times by the ordinary gynecological resources. At the last relapse, Dr. Massey said that if he did not cure her permanently this time, he would consent to an abdominal section being made. After weeks of electrical treatment—and during its progress she voluntarily came to me stating that she was getting no better, that she could bear her sufferings no longer, and that she would submit to the operation if I would perform it—on Friday, January 17, 1890, with the assistance of Dr. Bradford, and in the presence of half a dozen other gentlemen, I made an abdominal section and removed both tubes and ovaries. The omentum was adherent over the pelvic inlet, and required considerable manipulation to free it. Everything below it was adherent. One tube and ovary were curled up into a mass, and adherent on top of the fundus uteri. On one side there was a subperitoneal cyst containing a few drachms of serum, which was ruptured during the manipulation. On the other side the ovary was distended with about half an ounce of bloody fluid. Both tubes were two or three times their natural size, very hard, and indurated. There was no trace of the fimbriated ends in either tube, the fimbria and ovaries being blended into one. The patient made an uninterrupted recovery and went home at the end of two weeks. To-day, over six weeks after the operation, she is without a sign of her old pains. What will be the subsequent benefit to the patient can, of course, be only conjectured, although I have every reason to expect, from past experience and present indications, a permanent cure. However, this is not at all material to the present discussion, my object being to show that *electricity will not cure chronic adhesions and organic disease of the uterine appendages*, rather than to prove that surgery will.

Four years before this patient applied for treatment, she had an attack of post-puerperal trouble, which resulted in an occlu-

sion and destruction of both tubes, a general adhesion of all the contiguous pelvic serous surfaces, and was possibly the starting-point of the ovarian cystic disease. Whether there was pus in the tubes originally, I know not; there was none when she first came for treatment, and none at the time of the operation. With the exception of the pus, the tubes look in all respects like pus tubes, and are in just such a condition as pus tubes after the pus has been evacuated. The post-puerperal trouble finally subsided, leaving the appendages destroyed and adherent. After a lapse of time, owing to some indiscretion or exposure, an attack of pelvic peritonitis was set up as a complication. These attacks were repeated and became worse, and during one of them she made us her first visit. This was in September, 1888. After about five or six months' treatment, during which she was distinctly worse at times, she obtained relief, and was discharged cured, and was so reported by Dr. Massey in his letter to the *Annals of Gynecology*, August, 1889. She remained well for a number of months, and then, owing to another indiscretion or exposure, was attacked by another pelvic peritonitis. She remained well for only a few weeks this time, and then had repeated attacks at short intervals, until, finally, after sixteen and a half months, she was so worn out that she asked for an operation, which she had at first refused. During all this time her original disease (chronic adherent salpingitis) remained, and was in nowise affected by the treatment, unless it was made worse. I say made worse, because her old family physician, Dr. Raynor, examined her a week before the operation, and states that the disease was markedly worse than when he last saw her, one year and a half previously, since when she had been almost continually under electrical treatment.

What did the operation show? A condition of disease and adhesions which demonstrated most positively and conclusively that "the methods adopted" for her relief did not "include the morbid products within the interpolar zone of a galvanic current, and by cataphoric action promote their absorption," as was claimed. It proves beyond dispute, that not an adhe-

sion was disturbed, and that the tubes themselves had not even begun to show any alteration for the better. There was the disease, and there it stayed. If the local disease was as bad as ever, what, then, happened to give her that interval of several months of apparent cure? As I said before, she had had repeated attacks of acute pelvic peritonitis complicating the chronic organic disease. It was the acute peritonitis which was relieved, but which just as surely came back on the slightest provocation. Now, this is just the point which I wish to emphasize. Electricity, properly and carefully applied, will in time relieve the pain of the pelvic peritonitis, but under no circumstances can it influence for the better the resultant chronic adherent salpingitis of the original attack. The first attack destroys the tubes, and every subsequent attack makes the chronic disease worse. If one is satisfied simply to relieve his patient of the inflammatory attacks as they occur, and to have them keep on returning with repeated sufferings, he can turn to the electrical treatment. He will, however, find this a particularly slow method, and will discover that often he can relieve his patient more quickly by hot-water irrigations, glycerin tampons, and the free use of purgatives, combined with other well-known gynecological and general methods. If, on the other hand, he wishes to cure his patient permanently, he must remove the chronic disease which is the cause of the acute or subacute attacks; in other words, he must remove the uterine appendages. There is absolutely nothing short of this, in a certain number of cases, which will accomplish the desired end, and I am sorry to have to confess that this fails only too often.

Many women go for years after the disease has originated before the repeated attacks of peritonitis begin. During this interim the disease seems to remain latent, and does not give unbearable suffering. During this period a moderate amount of ordinary personal hygienic care will keep the woman in comparatively good health, and she may never reach the period of repeated attacks of peritonitis. But, if they once begin, the woman, especially the working-woman, knows few weeks

of comfort. As a rule, the danger to life is not great, but the constant suffering is extremely wearing, and the patients do not need much urging to undergo an operation in order to obtain relief. At any rate, electricity is absolutely powerless to cure them. The burden of the proof remains with the electricians. If they would convince those of us who have no faith in their methods, they must select their cases carefully, have them examined repeatedly by recognized and competent diagnosticians, and then, when they are through with their treatment, satisfy us that they are actually cured, and not simply relieved. It will not do that they should take a case in one of the periods of pain, relieve her of that pain, and pronounce her cured, even if she has no relapse for some months, or even a year or more. I have observed many of these women who have had their disease for four, five or more years, and during that time had only two or three attacks of peritonitis. They had been under no kind of treatment whatever, and, therefore, their immunity cannot be attributed to treatment. If, however, this immunity should occur after being relieved by electricity, it would be, and is, claimed as a cure. As a matter of fact, all the cases reported cured by this method have gone on record within a few months after the completion of treatment.

I do not mean to say that all cases of chronic adherent salpingitis should undergo an abdominal section, because I am becoming more and more convinced that entirely too many operations are made for this disease. If a woman is in good circumstances, and can have ordinary hygienic and dietetic care combined with slight medication from time to time, she can, in the majority of cases, live a comfortable life. It is of the minority I speak, when I say that abdominal section is the only cure.

There is one other point on which I would touch. The electricians triumphantly state that when they begin their treatment there is great pain and suffering, that large masses can be felt in the pelvis, and that as the symptoms subside under treatment these masses also fade and disappear. Such

was the state of affairs in the cases quoted from Apostoli, and also in the case I have reported above. Now what is the explanation of this? With every attack of acute pelvic peritonitis there are large quantities of plastic exudates thrown out, and a vaginal examination gives the impression to the finger of hard, board-like lumps. So often have I mistaken these temporary exudates, which almost always disappear with the subsidence of the inflammation, for large chronically diseased tubes and ovaries, that I now never give a definite and decided opinion until I have had an opportunity to treat the case, and am able to see what is temporary and what permanent trouble. Until this is accomplished, it often takes a very well trained finger to decide how much actual chronic disease exists. Here is a point of failure with the electricians. They get rid of the acute exudates, relieve the pain, and pronounce the patient cured, only to have them come back, or go elsewhere for treatment. The vast majority of these men are not trained in gynecological examinations, and have never done an abdominal section. I feel most strongly that no man is or will ever become a reliable diagnostician in these diseases until he has had his fingers on the disease both from below through the vagina and from above through the abdominal wall. It is well-nigh impossible to gain an accurate knowledge of the condition of affairs in a pelvis ravaged by a septic or specific inflammation without having had one's finger in a few such pelves and without having attempted to tear out the diseased parts.

What place, then, do I give electricity in the treatment of this class of diseases? Simply that of a therapeutic agent which will mitigate, but which will never cure. I class it with glycerin, tampons, hot-water injections, purgatives, etc., and I consider it the least valuable of them. The relief I have observed from electricity has been exactly what I have obtained from these other remedies, with this difference, that electricity is somewhat slower in its action. However, I must admit that I have seen electricity relieve where I had failed with other remedies, and *vice versa*.

Electricity I would hold, if I had determined on mere palliation, as a last remedy, for the following reasons:

1. The treatment must be a local one, and must be given by the physician himself.

2. The apparatus is too expensive for any but a specialist to possess.

3. The patient must submit to a prolonged vaginal manipulation several times a week, sometimes for months.

4. It is necessary to remove a great part of the woman's clothing in order to administer the treatment properly and thoroughly.

The absolute failure to cure the disease, which I have shown in the above case, I could easily demonstrate in many others.

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## DISCUSSION.

Dr. G. Betton Massey: I scarcely think that the experience of Dr. Baldy in the use of electricity entitles him to a claim to be heard upon that subject, for it can be no more than equal to my own competence to write on abdominal section. He has given us a critical examination of the single case on which the paper is largely founded, but I am sorry to say that this examination shows distinct signs of prejudice. He fails to take into consideration the fact that the electrical treatment of pelvic disease is essentially conservative. If it fails, other measures can be resorted to, for the patient has been made no worse. The whole of Dr. Baldy's observation of the electrical treatment of pelvic disease is with dispensary cases—a most unsatisfactory class for conservative effort. This particular case was a very bad one, but the facts relating to it have been sadly misquoted. The duration of the treatment was five months, and no longer, as may be seen by reference to Dr. Bradford's notes. It lasted from September to February, after which she had five months of complete cessation of the disease, and she was well in every way, a small painless lump in the region of the left ovary only remaining. Dr. Baldy errs in saying that the case was again treated. At the end of the five months she had a relapse, and went to the Pennsylvania Hospital when I was not in attendance. In October she saw me, and received one treatment. At this time there was a decided relapse, but as some of my own remarks discouraged her, no further attempt at a renewal of treatment was made, and she was operated upon in January. I have seen her since the operation, and though she no longer has the intense pain, she is by no means

a well woman, as she is now suffering from the results of the operation—from cut and tied nerves—giving a different form of pain.

My impression of these cases of pelvic disease is different from that of Dr. Baldy. At least two cases treated by this method have recently been reported by me as cured while under treatment at the dispensary of the Howard Hospital. One was a double salpingitis of one year's duration, and the other a double salpingitis that had made the woman miserable for five years. Both of these were cases such as are daily operated upon, and their cure under the electrical treatment has been proven in each instance by a normal pregnancy.

Dr. Baldy has very properly objected to the early report of this case. This is a lesson which my surgical friends need to take to themselves. What we want are the results, which time alone will show—not merely the wet specimens that are so numerously presented at our society meetings.

In regard to adhesions. I would ask the reader of the paper if he would open the cavity of the pleura and cut out the lung for adhesions that no longer give rise to symptoms? I have seen adhesions loosen, and he has seen them loosen in my practice, but I certainly do not think that all these old adhesions will give way and disappear under electrical treatment, neither is it necessary that they should do so. In other parts of the body we have adhesions which are innocuous—why not here? In case we cannot remove them, we may at least render them painless by removing concurrent irritation. It is, by the way, amusing to note that these opponents of electricity deny the possibility of a disappearance of adhesions under electrical treatment on one day, and the next day are found explaining the shrinkage of fibroids by saying that it is merely the disappearance of adhesions.

Dr. James Hendrie Lloyd: In discussing this subject, it must be remembered that the laws of electrolysis are among the best approved of the laws of physics. We know that the passage of the slightest current through a fluid or solid will cause a breaking up of the constituents of that fluid or solid. We know that this electrolytic action is in exact relation with the amount and duration of the current. This holds not only in regard to a simple fluid, like water, but also in regard to the more complex fluids of the body. If we wish to produce an electrolytic action, the current must be brought into immediate contact with the part to be broken up, and if we wish to break up the part we must have a relatively strong current. I do not see how by passing a mild current through the mucous membrane of the vagina, causing its diffusion through the tissues of the pelvis, we can be sure that the current will search out the diseased tissue and leave the healthy tissue alone. I think that the fault here is not in the electrolytic power of the current, but in the ability of the gynecologist to apply it definitely to the particular place in the pelvis where it is needed. It will do as much damage to normal tissues as to the abnormal. The electrolytic action of the galvanic current is of service in neoplasms when the current is applied under proper

circumstances. I have seen it do good in bronchocele. I have reduced such tumors by galvano-puncture. Dr. John Duncan, of Edinburgh, has demonstrated to the profession that this is a desirable method of treating large nævoid growths. In uterine fibroids, where the current can be brought directly into contact with the neoplasm, there is no reason why a strong current should not reduce the tumor.

Dr. Massey: It strikes me that Dr. Lloyd's presentation of the subject is a little beyond the mark. He hits upon the rock that many of us have struck in taking the word electrolysis as the sum and substance of all that is accomplished. The assumption that I have made, not as an *a priori* consideration, but as the result of observation in the loosening of fixed uteri and the lessening of pain, is that the current traversing the tissue markedly stimulates cell life. What does this stimulation do but promote a metamorphosis that aids in the destruction of morbid processes and the construction of healthy tissue? I do not regard the effect as due to polar electrolysis, though it is possible that some of the effect may be due to a local derivative action on the vagina.

I begin treatment in these cases by vagino-abdominal applications, the vaginal pole being negative. I am afraid to begin treatment by intra-uterine applications, as it is well known that any intra-uterine applications may make these cases worse; yet there are times when they are of extreme value in certain stages, as it should be remembered that the trouble is largely seated in the uterine cavity.

Dr. Baldy: It seems to me that the opinion of Dr. Lloyd, who has given this matter a practical test and has had his cases diagnosed by expert gynecologists, is of great value. If there was going to be any absorption produced by these heavy currents, we should expect it to occur in the vaginal tissues with which the electrode is in direct contact. As a matter of fact, there is no absorption either of the vaginal tissues or of the adhesions in the pelvis.

Dr. Massey's criticism in regard to dates is hard to answer, for I have taken all the dates from his own published reports of the case, and they are correct according to the books of the Howard and Pennsylvania Hospitals and my own private books.

My experience, it is true, is largely based upon dispensary cases, but most all of the cases reported are dispensary cases. I have, however, seen exactly the same failures in private practice.

In regard to the two cases reported cured and bearing children: if these were cases of pelvic inflammatory disease, it would be, of course, a great step in the line of proof. If the fimbriated extremity of the tube is destroyed, it is a physical impossibility for an ovum to pass. If after a few months' treatment an ovum does pass, we must conclude that there was a mistake in diagnosis, and we are all painfully aware how easy such a mistake is.

# INSTRUMENTS FOR ELECTROLYSIS.

By J. SOLIS-COHEN, M.D.

[Exhibited March 5, 1890.]

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I PROPOSE to exhibit some instruments for electrolytic purposes which are somewhat different from those used for the last quarter of a century. These are suitable to operations on the pharynx, nose, and larynx, but the principle is adapted to any organ or morbid growth. Instead of using a single needle, or even two needles, at a distance, Voltolini, of Breslau, believed that by concentrating the action more closely he could produce better results; and my own work shows that he is correct. I pass around a few of these instruments. Some of these electrodes are in the form of forceps, and can be applied to growths in locations not accessible to the ordinary electrode. There is another point which is a novelty in electrolysis, and that is, if you wish to act over the surface you can do so with a flat conductor, instead of one provided with points. This is applied to the surface; the water is decomposed; the solid tissues become mummified, and some of them are cast off and others absorbed. Here is an electrode which I have used in a case of epithelioma of the palate and pharynx, under which, to use an expression derided to-night, the growth "melted like snow before the sun."

Sometimes you want a more active effect from one pole than the other; here is one in which one electrode is provided with several points, while the other has but one.

I wish next to show an instrument for electro-transillumination of cavities. When laryngoscopy was first introduced, it was suggested that the larynx be illuminated by allowing sun-light to impinge directly upon it. This did not succeed, except under unusually favorable conditions of patient and atmosphere. When Edison perfected his little loop-lights, Voltolini adapted them to this purpose. Here is a light of two or three volts, protected by a thick glass cover. When this is placed in the pharynx, you can see almost back to the pharynx through the nose. If placed in one nostril, it will light up the other one through the septum. If placed behind the palate, you can determine the extent of infiltration in disease of that tissue. By placing the

light in the mouth, you can see the translucence of the antrum, and in this way determine whether the antrum is empty or not.

I have here a lantern containing a lamp of about eight volts. In front of that lamp is a globular ball filled with water and acting as a lens. It is intended to apply this externally and transmit light into the larynx. This is Treudenthal's modification of Voltolini's lantern. It is placed over the larynx, while the laryngoscopic mirror is introduced into the illuminated pharynx. I have never been able to see with it anything but a translucent shimmering of the entire tissues, and have not been able to detect any details of structure.

I have here some instruments belonging to my friend, Dr. Hoch, which he has brought with him from Vienna. There is another means of trans-illumination, by means of a glass rod carrying the light from the lamp. This method has been utilized for bedside use by substituting a candle for the electric light as in this instrument. It enables you to examine the throat or to make a laryngoscopic examination quite satisfactorily. If the rod is placed in one nostril, it lights up the other side.

There are also here a couple of electric laryngoscopic reflectors. One of these reflectors is provided with two openings, so that both eyes may be used. My experience with electricity for laryngoscopic purposes is that it is much inferior to the ordinary Argand burner. The illumination is great, but the shadows are equally great.

# DISLOCATION OF BOTH BONES OF THE FOREARM FORWARD.

By W. S. FORBES, M.D.

[Read March 5, 1890.]

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In the *Transactions* of this College, May 5, 1869, vol. iv., New Series, will be found the record of a case which I placed before the College, of dislocation of both bones of the forearm forward.

After the lapse of more than twenty years I will now place before the College the history of another case of this very rare accident which occurred of late in my practice:

W. H. J., forty-nine years of age, a farmer, living not far from Camden, New Jersey, came to the Jefferson College Hospital on the 5th of December, 1889, with his family physician. He stated that late in the day before he had been thrown from the top of his hay wagon, and that his elbow had been violently wrenched on the moment of his coming in contact with the earth. He had suffered no further injury beyond some contusions.

When he presented himself at the hospital his left arm was found much shorter than its fellow of the opposite side, and the forearm correspondingly lengthened and nearly at right angles with the arm. The tendon of the biceps muscle was tight and prominent and the hand supinated. As he could not tolerate any handling of the limb, he was at once placed under the influence of ether; and on examination it was found that the olecranon was in front of the trochlear of the humerus; that a line drawn from the most prominent point of the external condyle of the humerus to the most prominent point of the internal condyle, was below the level of the plane on the inferior and subcutaneous surface of the olecranon and ulna; and that there was a space between the head of the radius and the radial head or capitellum of the humerus in which the thumb could be easily placed. The position in which the bones of the forearm were found in their relation to the humerus was so obvious, and manifestly being entirely in front

of it, that I immediately called my chief clinical assistant, Dr. Addinell Hewson, Jr., into the room to examine this very rare dislocation. My other clinical assistants were also present. There was not a doubt on the part of any one present as to the complete forward dislocation of both bones of the forearm.

The reduction was easily accomplished by flexing the forearm on the arm, the object being to disengage the posterior and superior margin of the olecranon from its position in front of the humerus; while, at the same time, both radius and ulna were forced downward and backward.

In less than a week the man returned to his home in the country, cautioned to still wear the anterior rectangular splint which had been applied after the reduction, and not to remove it until his family physician thought proper to do so.

# THE WATERS OF ROME.

By COMMENDATORE GREGORIO FEDELI, M.D.,

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[Read April 2, 1890.]

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Mr. President and Fellows of the College of Physicians of Philadelphia: Honored by you, my respected colleagues, with the title of Corresponding Member of your celebrated medical association; highly appreciating the honor conferred upon me, which is greater than my merit deserves, I flatter myself that you will courteously receive this my modest work on the "Waters of Rome," as a small proof of my *grati animi.*

The moral and scientific interests which connect me with your honored country have, I may say, almost imposed it upon me as a duty to throw some light upon this important question, in order to dissipate the fears and erroneous impressions which prevail about it; and this for the general interests of health.

The intellects of the civilized world belong to Rome. A residence within her boundaries ought not to awaken uneasiness and distrust.

## I.

Rome, the famous and unique name, which in all times and among all nations has been the appellation of the *Civitas;* the Queen of the Universe; by Ateneo called *Orbis Compendium;* by others *Amor*, is in the opinion of its admirers the most illustrious city of the world; the historic capital of Italy; the

metropolis of the Catholic Faith; and, at present, after the lapse of ages, the political capital of the Kingdom of Italy.

It is situated on both banks of the Tiber, twenty kilometres from the mouth of the river.

The remains of its monuments bear witness to its past greatness, and among these are the ruins of its baths and aqueducts. These last being restored, convey to the city an abundance of living water, which displays itself to advantage in the monumental fountains that adorn modern Rome. Its supply of drinking-water is better than that of any other city in Europe. In ancient times it was still better. The vicissitudes through which the country has passed have led to the dispersion of some of the sources. We know that Plinius mentioned the aqueducts of Rome among the wonders of the world. Dionysius, of Halicarnassus, says that the three works which especially manifest the power and magnificence of the Romans are the great roads, the sewers, and the aqueducts.

The Consul Frontinus, inspector of the aqueducts under the Emperor Nerva, writes that in nine aqueducts there are contained 13,694 tubes a finger's breadth in diameter. Vegetius calculates that Rome received in twenty-four hours 5000 moggia of water (cubic metres, 43.20). The nine aqueducts were distinguished either by the names of the waters which they conducted or by the names of the persons who had ordered their construction; and so we have Acqua Appia, Aniene Vecchio, Marcia, Tepula, Giulia, Vergine, Assientina, Claudia, Aniene Nuovo.

The first three were constructed in the year of Rome 441 and successive years. Large sums were expended in bringing the waters from sources distant from forty to sixty miles. The others were constructed later.

On the Roman Campagna there are still to be seen the remains of aqueducts varying in construction according to the epoch in which they were built.

It is also to be noted that the Romans constructed aqueducts in all the countries which they ruled, and the ruins of them are still to be seen in France, Spain, and elsewhere. But

many of these beautiful products of Roman greatness perished among the commotions of the ages. We know, in fact, from Vitigius, that the aqueducts were almost entirely destroyed in the invasion of the Goths, and restored in later times by Trajan and others.

But it was in the years 1447 that Pope Nicholas V., finding Rome unprovided with water, reëstablished a free course of the Acqua Vergine, already introduced by Marcus Agrippa in the year 734, but which for some time had ceased to flow, because the aqueduct was broken and choked up with earth.

This aqueduct alone was maintained until Pope Sixtus V., wishing to make provision of water for the Quirinal, Esquilene and Viminal Hills, which had been abandoned by their inhabitants on account of the want of water, in 1587 connected some streams which flowed near the estate of Pantano, and which probably belonged in part to the old Alexandrine water brought to Rome in 226 by Augustus Alexander, in part to other springs near Lake Regillus, under Castle Colonna—ancient Labico. Having effected this reunion, the Pope gave to the water his own name of Felice. In 1609 Pope Paulus V., finding that the conduit of the Acqua Trajana was almost destroyed, ordered it to be restored, and introduced into it the waters of Lake Sabatino in order to augment the volume for the benefit of the inhabitants of Trastevere, as well as of the manufactories situated on the Janiculum Hill, giving his own name to this *Paolà* water. These were formerly the three principal potable waters brought to Rome by means of aqueducts, and feeding the various parts of the city; not to mention the other little springs which welled up at the bottom of the seven hills, and supplied in great part the large number of wells which existed in private dwellings.

To these three principal waters above mentioned must now be added a fourth, which was brought to Rome twenty years ago by a private society, and called Pio-Marcia. It has its origin in the vicinity of Vicovaro, and has been called Marcia since ancient times, being a part of those waters which supplied old Rome. This most salubrious water, which flows

through iron pipes in an extraordinary quantity into the city and environs, is able on account of the elevation of its source to reach the highest part of the town.

The dispersion of some of the waters which supplied ancient Rome has not resulted in the least damage to the modern cty. The four sources which furnish a perennial supply are sufficiently exuberant to satisfy the needs of the increasing population of the capital of Italy, and the plentiful remains are always used to cleanse the sewers.

Nevertheless, gentlemen, this Rome, so wonderfully supplied with potable water, historically recognized as such, examined and commended by eminent and competent men in all ages, has not failed in various epochs, and especially at present, to have its detractors. These must be influenced either by envy, malevolence or ignorance. Among other charges brought against the Roman waters, is that of being infectious, and so originating the fantastic *Roman fever*, so dreaded by the credulous, and especially by the strangers who come here to enjoy the art treasures of our city. It is frequently my lot to listen to these criticisms and fears, expressed by those who consult me professionally. No country, I think, is so feared by strangers, so regarded as a centre of infection, as Rome; and yet it is well known that there are other great cities still more attractive and fashionable, where, owing to the local hygienic conditions, inhabitants and travellers are constantly exposed to deleterious effluvia; and where, moreover, the waters are impure and not so abundant. Here they encounter serious and infective maladies by the hundred, and die in great numbers. In these cities, however, including fascinating Paris, they fall ill and die without any noise being made about it. But if one such case occurs in Rome (being frequently imported), there appear, a few days after, in the foreign newspapers, greatly exaggerated accounts of it. Instead of one case there is said to have been many, and, of course, *cela va sans dire*—the patients have died of the mythical Roman fever. Thereupon, ministers, consuls, bankers, physicians, friends, are all questioned upon the subject. They reply that the state-

ments of the journals are all false; that the population of Rome is in a healthy condition, and that this is proved by the official weekly statistics. Still, though the information comes from official sources, many people think that it is not correct, and prefer to pin their faith to this or that newspaper, whose correspondent has sent false news in order to serve some unworthy end. It is well known that this is done in order to keep away those timid and credulous foreigners who wish to enjoy the beauties which they find under the beautiful Italian sky, and with the intention of injuring the interests of the country whose political reconstruction they hate. And it is true that these reports do prevent many timorous people from coming to Rome, or if they come, they hurry away in a few days, uncertain what may be the condition of their health on the morrow. These impressions and fears are not removed, though in their walks about the city they see a population hale, robust, prepossessing, and full of life. Their prejudice makes them blind.

The malevolent doubts excited in order to blacken the ancient fame of our drinking-water, which is known to be of exceptional purity, has induced the municipality of Rome to authorize a new and accurate analysis of the principal waters which supply the city—*i. e.*, the Vergine, the Felice, the Paola, and the Marcia.

You, my colleagues, know well the important influence which water exercises upon the health of the population and the propagation of infective maladies; therefore it is not necessary for me to dilate upon that subject. All praise to the municipality which has ordered the new analysis!

Let us sum up the results of the analytic studies of these waters, which were made at the Chemical Institute of Rome. The honorable Senator, Prof. Stanislas Cannizzaro, is the director of the Institute. He assigned this analysis to Dr. Mauro, of Naples, Professor of Docimastic Chemistry, to Dr. Puccini, Assistant-Professor of Mineral Chemistry at Rome, and to Dr. Nasini, Assistant-Professor of Docimastic Chemistry at Rome.

In treating of the waters which supply a great city, Prof. Cannizzaro says: "My desire has been not to limit the examination to those partial experiments which are considered sufficient for a summary judgment. I have intended that a rigorous and complete chemical analysis should be made, and I have, therefore, trusted the execution of it to the three above-mentioned professors, who have devoted themselves for many years to the chemical analysis of water, acquiring thereby great skill, of which they have given distinguished proof in their valuable published works, especially those upon potable waters and the method of analyzing them. They have also followed and taken part in the long and animated discussions which have been carried on in recent times on the important question of chemistry in its application to hygiene."

One may therefore have perfect confidence in the results which they have reached, so that there cannot be the least doubt about the composition of the four above-mentioned drinking waters—*i. e.*, about the nature and quantity of the gases and solid substances which they hold in solution. This accomplished, the task of the chemist should be considered fulfilled. But in treating of potable waters we ask of the chemist, What should really belong to the professor of hygiene? We claim that from the data of certain facts he should be able to pronounce judgment:

1. Upon the effects which the materials dissolved in the water have upon the health of the persons who drink it.

2. Upon the contingent dangers which in case of epidemics (cholera or typhoid) may result from the use of an especial water.

As to the first topic, continues Prof. Cannizzaro, the chemist, as well as the professor of hygiene, should found his judgment upon long experience collected in statistics, from which are taken the following rules:

1. That may be considered good drinking-water which is limpid, which does not contain an appreciable quantity of organic material—above all, that which is of animal origin—nor of ammonia; and which, when it has evaporated, leaves a

residuum not exceeding 50 grm. per 100 litres. And this residuum should contain none but alkaline salts and earthy alkalines; not more than 30 grm. of earthy carbonate, not more than 4 grm. of magnesia, and not more than 6 grm. of sulphuric anhydrides corresponding to the sulphates.

Now, the result of the analysis of the four potable waters of Rome satisfies entirely all these conditions, and, therefore, *confirms their ancient reputation.*

The best are the Marcia and Vergine waters, the first having the advantage of the lowest temperature. The Felice, although as free from organic matter as the other two, must be considered inferior to them, because it contains a larger quantity of calcareous salts than the Vergine or the Marcia water—that is, it is harder than this last, though it appears to be less so, because it does not easily deposit the earthy salts which it holds in solution, on account of the silex which it contains.

The Paola water, which is a mixture of the water from the Trajan source and that of the Lake of Bracciano (Lake Sabatino), although it leaves less residuum than any of the others, and has a smaller quantity of calcareous salts, and is, therefore, as one may say, lighter, is nevertheless inferior to the two first mentioned sources, because it contains a small quantity of organic matter, probably of vegetable origin; a quantity which may be augmented by the variation of the level of the lake. The springs of the Trajan water, however, in their freedom from organic substances and in their composition resemble the Vergine water. However, neither the Paola nor the Felice water, according to the analysis made in the month of March, can be excluded from the list of tolerably good drinking-waters, since the hardness of the one and the organic material of the other do not exceed the limit assigned for good waters.

According to the chemical analysis which has been carefully and scientifically performed by the three above-mentioned professors, the two sources Marcia and Vergine are considered equal in respect of their availability as drinking-water; nevertheless they are quite different as far as concerns the

composition of the small quantity of solid material which they hold in solution. They are, in fact, natural waters belonging to two different types, as they differ in their origin. In the Marcia water the residuum is almost all carbonate of lime coming from calcareous earth; in the Vergine the carbonate of lime is accompanied by an appreciable quantity of silex and alkaline salts, among others the potassic salts, because this water is condensed and passes through disintegrated volcanic ground, and spouts up among the *pozzolane* (a kind of volcanic earth), in the so-called farm of Solone. This water was called Vergine because, as Frontino says, *quærentibus aquam militibus puella virguncula venas quasdam monstraverit, etc.*

But the most scrupulous examination has furnished no proof of any difference in the effect of the two qualities of drinking-water upon the people who drink them. Some Italian and foreign physicians have suspected, *à priori*, that water containing so much carbonate of lime as the Marcia would favor the formation of vesical calculi; other physiologists, on the contrary, have concluded that water of this kind is useful for the nutrition of bony tissue. On the other hand, some have fancied that the potash salts contained in the Vergine water might be injurious, while others have considered them and the other alkalines which accompany them as beneficial in their results. The statistics show that neither party is right. The English commission confirms the above statement.

The Rivers Pollution Committee, in one of its last reports, concludes, after most accurate study, "that water which does not contain deleterious organic matter, and does not leave a considerable residuum, is equally salubrious whether or not the residuum contains more or less carbonate of lime, more or less alkaline salts."

The reason why the Vergine and Felice waters contain a quantity of the nitrates and also of the chlorides exceeding the minimum found in the springs of other countries, and among other geological conditions, is as follows:

Drs. Mauro, Piccini, and Nasini have succeeded in demon-

strating, by ingenious investigations, that this exceeding quantity of nitrates always exists in water which undergoes condensation in the volcanic ground surrounding Rome, and especially if it be forest land. It is understood that the possibility is excluded that these nitrates may come from material excrements. Every suspicion of this kind, which might be excited by the fact that nitrates have been found in the Felice and Vergine waters, has been entirely removed. This is confirmed, as you, gentlemen, already know, by the opinion expressed by Dr. Leeds, Chief Engineer of the Water Department of Philadelphia. It is, however, impossible in the present state of science to say whether the water may favor more or less the development of morbific germs which may casually fall into it, or whether it is likely to retain them.

But it is necessary to pay great attention to the physical properties of drinking-water, as well as to its chemical composition. Hence a water to be called good should be limpid, without color, without odor, agreeable to the palate, of a rather low temperature; not varying much at different seasons, so that it may seem cool in summer and temperate in winter. Various observers have assigned 15° as the highest temperature for good water, and from 4° to 6° as the limit of variations. Our waters possess these physical properties, and, therefore, merit on every account (with some gradation of the various sources) to be put in the first rank among potable waters. The Marcia and the Vergine are the best; then the Felice and the Paola. By means of these four aqueducts, the Vergine bringing during the twenty-four hours 80,000 cubic metres of water, the Paola 40,000, the Felice 18,000, and the Marcia 108,000, Rome is supplied with a superabundance of drinking-water.

## II.

In the summer of the year 1884, Rome being threatened by cholera, and the neighboring cities and districts infected with it epidemically, the municipality, with the wise intention of

removing every cause known to science which could possibly transmit infection, charged Professors Tommasi-Crudeli, Marchiafava, Marino, Zuco and Celli to make a chemical and bacteriological analysis of the subterranean waters of Rome, which were collected abundantly in wells, and supplied a great part of the population. These examinations were scientifically and accurately performed, and it was concluded by the examiners that all the subterranean waters were more or less defiled by the presence of bacteria, and were, therefore, not fit to be used for drinking purposes. In fact, the municipality at the instance of Dr. G. Bastianelli, the Chief of the Health Office, ordered all the wells of the city to be immediately closed. In order to supply the deficiency occasioned by this measure, it was arranged that perennial fountains of Vergine and Marcia water should be multiplied in various parts of the city. Thanks to this and other hygienic measures, Rome was free from the epidemic of cholera, as it is from other infectious maladies.

Through the micologic work of Professors Celli and Marchiafava we have been made aware of the existence of a very active micologic vegetation in the above waters, and of the presence in general of microörganisms, capable of producing with more or less rapidity the putrefaction of gelatin.

Studying, therefore, the position which these waters occupy in the subterranean stratum through which they flow, one quickly finds the cause of their contamination. Drs. Zuco and Celli, measuring the height of several wells, found that the watery stratum was very little lower than, if not of the same level as, the drains of the city. The conclusion is obvious.

Professors Zuco and Celli making micological experiments in the waters of the wells and in that of the little Roman springs, have generally observed that the most diffused and vigorous microörganism, and the one which forms the largest colonies, is always the *bacterium nitrificans.* They observe that it finds in the waters they have analyzed all the conditions favorable to its active existence. They conclude, therefore, "that these waters are not only injurious to the persons who

persons who drink them, but that they are very dangerous to the public health, and, therefore, they must be prohibited for the interests of general hygiene."

The foresight of the Roman administrative corporation deserves praise for having ordered a new analysis of the drinking-water of Rome and of that of the subterranean soil. In consequence of the accurate examination of the former, the credulous and timid may be assured of their perfect salubrity. The impurity of the latter has been recognized; they have been pronounced unfit to drink, and the order has, therefore, been given to close all the wells.

And now, my colleagues, I ask you whether in a city so largely supplied with pure water as is Rome of the present day, where for so many years efforts have been made under the guidance of hygiene to remove the causes of infection; under a splendid blue sky and with pure air; provided abundantly with all that life requires—one can cling to the idea of insalubrity? Need one fear to live in Rome? I leave it to you to judge.

We who are Roman physicians practically observe that from year to year the amount of disease is diminishing, and this statement includes the cases of malarial fever which formerly prevailed in the summer and autumn among the inhabitants of certain parts of the city, and among those who live in the Campagna. The prevailing maladies among the people in general are phlogistic, rheumatic, gastric, catarrhal in their nature. We do not often encounter infectious diseases, much less frequently those of an epidemic character, such as diphtheria, croup, scarlet fever, smallpox, typhoid fever, abdominal typhus, cholera, etc. Often, however, we observe that there is malarious complication together with inflammatory, rheumatic, and other diseases, and in such complications the physician should be very accurate in his curative treatment. It is well known that such infectious maladies dominate in many cities endemically, or develop epidemically at certain times of the year, destroying many young lives upon which

were centred the hopes of kindred and country. That does not happen in our city.

I have thought it sufficient for my present purpose to mention the principal results of the recent examination of the waters of Rome made by the above-mentioned professors of chemistry and hygiene. These are to be found in the reports made by Professors Cannizzaro and Tommasi-Crudeli to the Syndic of Rome. I omit all reference to the especial processes employed by them in determining the quantity and quality of the substances contained in the water which they analyzed. Also, I do not refer to the chemical and bacteriological processes used in examining the subterranean waters.

I cherish the hope that the contents of this paper may accomplish the object which I have in view, viz., to destroy the widely spread error that Rome is an unhealthy city, and, therefore, to be avoided. You may, gentlemen, be conscientiously assured that few travellers fall ill in Rome. Not a few arrive there already affected with special maladies. Others are indisposed in consequence of fatiguing journeys, made without taking into account individual and hygienic conditions. Moreover, these journeys are frequently made in a vigorous and variable season of the year, when the state of the atmosphere predisposes to maladies.

If there be other cases of illness, they are generally the result of imprudence and of over-fatigue—the regular diet and hygienic laws which in any country, and above all in a foreign one, it is necessary to observe, being utterly neglected.

# ŒSOPHAGOTOMY FOR IMPACTION OF ARTIFICIAL TEETH.

By JOHN B. DEAVER, M.D.,

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[Read April 2, 1890.]

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THE patient, a white man, aged twenty-seven years, was admitted to the insane department of the Philadelphia Hospital in the early part of July 1889, with the following history: After an alcoholic debauch, lasting three weeks, he became so unmanageable as to require removal to a police station, where he was placed in a cell. While there he fancied that demons were preparing to kill him, which led him to attempt suicide by striking his head against the wall. A few days later he was taken by the police authorities to the hospital.

On admission, examination of his face and scalp showed many contusions. He complained of sore throat, was unable to swallow solid food, and could with difficulty swallow a small quantity of liquid. There was profuse purulent and offensive expectoration. Examination of the mouth showed an acute pharyngitis, also the absence of a number of teeth from the upper jaw. In the centre of the hard palate was a prominence of mucous membrane like that made by the plate of false teeth. He casually remarked that he had lost his teeth. Local treatment was given for the pharyngeal trouble, with no effect. A probang passed into the œsophagus demonstrated the presence of a foreign body at a distance of about two inches from the commencement of the tube. Having recovered from the effects of the alcohol he was apprised of his condition and advised to have whatever interference might be necessary for the removal of the foreign body, which was most probably the missing plate of teeth. To this he consented, and accordingly I made an attempt to remove the foreign body with a pair of long, well-curved forceps. With them I could reach the body, but was unable to grasp it, and before adopting any other procedure I had the patient etherized. Under complete anæsthesia a second attempt with the forceps was made, but with the same result as before. I now tried to dislodge it with the œsophageal probang,

but it was so thoroughly fixed that I was not able to accomplish anything. There was then left but one course for me to pursue, that of opening the œsophagus at the side of the neck. The patient was placed with the head inclined to the right side, the left side of the neck being selected through which to make the incision, and the shoulders raised upon a pillow. An incision, commencing at the sterno-clavicular articulation, was carried through the skin to near the angle of the jaw, when the anterior jugular vein very much distended was seen in the superficial fascia. The vein was ligated at two points and, with the fascia, severed between. The deep fascia was now incised, lifted upon a grooved director and divided to the length of the superficial wound, when the sterno-mastoid muscle with the bloodvessels was displaced backward, the anterior belly of the omo-hyoid muscle downward, and the sterno-hyoid and sterno-thyroid muscles forward. The œsophagus, made prominent by the distention occasioned by the foreign body within, was clearly exposed. Above and below the distended portion of the œsophagus were seen the superior and inferior thyroid vessels. The œsophagus was opened in the line of its longitudinal muscular fibres, when the knife came directly upon a tooth. The wound was then enlarged upward and downward to the extent of two inches, when the plate of a partial set of teeth was exposed lying upside down and crosswise, the front of the plate, containing two teeth, presenting at the bottom of the wound. After a great deal of difficulty I succeeded in removing the plate, and upon removal it was found that a tooth was missing. This was expectorated during the night following the operation, and I have no doubt that it was detached during the extraction of the plate. The wound in the œsophagus was closed with catgut sutures, a rubber drainage-tube placed external to it, and the superficial wound closed with silver wire. The patient reacted well and was nourished for three days entirely by enemata of dextrine, eggs, beef tea, and peptonized milk. From this on he was given, in addition to enemata, milk and whiskey, introduced into the stomach by a pliable tube passed through the anterior nares. The expectoration continued to have the same character as before the operation.

The wound was dressed the third day after the operation, when it presented a perfectly satisfactory appearance. Two days later, the dressing being much soiled, the wound was exposed and a purulent and offensive discharge was seen escaping from and around the tube. The apparent line of union was much inflamed, showing some signs of breaking down. The following day the discharge having soaked through the dressings, they were removed and the wound was found broken down throughout, the tissues presenting a gangrenous surface. Liquids now introduced in the mouth escaped through the wound. Wound packed with iodoform gauze. On the evening of the sixth day after the operation the patient had a chill, followed by high temperature, rapid pulse, and increased frequency of respiration. Examination of the chest demonstrated the presence of pneumonia of both lungs. On the following day, the seventh after the operation, he died.

*Autopsy, made forty hours after death.* Examination of abdominal cavity showed the kidneys to be large and intensely congested. Spleen enlarged, soft, and pulpy. Other abdominal viscera showed no gross lesions. Heart and pericardium normal. Both lungs contained innumerable dark-red solid areas, varying in diameter from one-eighth to three-eighths of an inch, which appeared to be peri-bronchial. Examination of wound showed the condition as described at the third dressing. The larynx, trachea, œsophagus, and lower portion of the pharynx were removed in a single mass. On the left side of the œsophagus immediately below the cricoid cartilage, was seen the incision through which the teeth were extracted. The edges of the opening were dark in color and gangrenous; it measured one and one-half inches in length and one inch in width. On the same side of the lower portion of the pharynx was an opening about the size of that in the œsophagus, and presenting the same appearance. Through this opening was seen exposed the left superior cornu of the thyroid cartilage, also the upper border of the cricoid cartilage. Immediately above the cricoid cartilage, a little to the left of the median line posteriorly, was a small opening leading into the larynx. In the extreme lower portion of the pharynx, posteriorly and a little to the left of the median line, was an ulcer one-fourth of an inch in diameter which had perforated the walls. The mucous lining of the pharynx immediately surrounding the openings was gangrenous. On the laryngeal surface of the epiglottis was a small superficial gangrenous ulcer. There were evidences of an active laryngitis, tracheitis, and bronchitis.

I believe the teeth were first arrested in the lower portion of the pharynx, remaining there long enough to set up the destructive inflammation which resulted in the formation of the openings found, and which, coupled with the efforts of swallowing, caused them to be dislodged; they becoming fixed the second time and permanently in the upper part of the œsophagus from which they were extracted.

In the light of the autopsy it is quite evident that the patient could not have lived with any treatment, but the points for discussion in the case of foreign body in the œsophagus calling for operative interference are the following: First. When it is impossible to extract the foreign body through the mouth, but possible to push it down into the stomach, is it not better to do this, providing its character is such as not to lacerate the walls of the œsophagus, and perform gastrotomy, than to remove it by the operation of œsophagotomy, as the former operation offers a better chance for success than the latter?

Secondly. Having done an œsophagotomy, is it better to close both wounds, or simply close the œsophageal wound, packing the wound in the neck, or to allow both wounds to remain open? In another case such as I have reported, I would not close either the wound in the œsophagus or the wound in the neck, but would trust to healing by granulation, as I believe in this case drainage was an essential factor which was by no means thoroughly obtained.

# ON THE EMPLOYMENT OF THE CATAPHORIC ACTION OF THE GALVANIC CURRENT FOR THE REMOVAL OF SYPHILITIC NEW-GROWTHS.

## A Contribution to the Medical Treatment of Tumors.

By FRANK WOODBURY, A.M., M.D.,

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[Read May 7, 1890.]

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Mr. X., married, thirty-three years of age, a travelling salesman, contracted primary infection in May, 1885. He at once put himself under my charge, and I gave him the usual treatment, varying the forms of mercurial from time to time, but relying principally upon gray powder, two grains three times a day. Secondary symptoms were moderately severe; there was not much sore-throat, but there were "milk-spots" and ulcers in the mouth, falling-out of hair, and eruptions on the skin, especially psoriasis of hands and feet. Treatment was discontinued at the end of two years from infection. About one year and a half ago, he presented himself with a tubercular eruption over the left eyebrow, and in the course of about a month this had appeared upon the left side of the nose and from there had spread over the entire lower half of the organ. Isolated tubercular lesions appeared upon the upper and lower lips and upon the chin. The masses were flattened, and showed a tendency to run together. The surface was slightly reddened, and in a state of congestion. The orifices of the sebaceous glands were prominent, and large plugs of sebaceous material could be expressed by moderate pressure. The course of these lesions was indolent, and seemed very little influenced by treatment, either local or systemic. The patient was much annoyed by the appearance of his face and the comments excited by it among his friends, and very faithfully carried out the means advised for his relief. Wet dressings and dry, plasters and ointments, including resorcin and ichthyol, were resorted to, and iodides and *Sirop Gibert* were given, but with little apparent effect, except to prevent the further progress of the syphilide. Finally, while continuing the specific treatment by potassium iodide and

bichloride of mercury, about three months ago I concluded to try cataphoresis; using a solution of iodide of lithium (five per cent.).[1] The applications were made upon absorbent cotton, applying the anode over the new-growth and the kathode at a distance. The anode being quite small, it was found that a current of from two to three milliampères was as much as the patient could bear without actual pain. The applications were made with moderate pressure, lasting from five to fifteen minutes, at first every second day, and subsequently twice a week. The improvement was evident; though slow at first, it has been very marked since this method was adopted, although due credit must be given to the internal treatment, which has been steadily continued. One fact illustrating the influence of treatment should be mentioned. Within the last year he has had the pleasant addition to his family of a girl, who is the picture of a healthy baby, and is without apparent blemish.

[The patient was exhibited, showing only a trace on the upper lip of the tubercular lesion. The nose was still somewhat swollen.]

Remarks.—It is a source of gratification to the patient that there was no ulceration following the extensive infiltration of the deeper layers of the skin, thus avoiding cicatrization or scarring, which in this situation would have been very disfiguring. It may be assumed that the treatment exercised a decided influence over the course of the disease, especially as the patient was under excellent hygienic conditions and possessed a good constitution. I was led to the adoption of cataphoresis by the slow effects from systemic treatment, and by revolving in my mind the problem of how to carry the remedies to the cell-groups more directly and in greater quantity than through the ordinary channels, more especially because he did not bear iodide of potassium well and the treatment required frequent interruptions. I believed that the iodine was the principal or active agent in causing the absorption and disintegration of syphilitic new-growths, and the thought occurred to me that the cataphoric action of the galvanic current was just what was required to solve the problem. Of the various iodides, I selected the lithium compound because of its solubility, and because the lithium might assist in carrying off nitrogenized waste; probably the potassium salt, which is

[1] The current was obtained from six to eight cells of a Waite & Bartlett twenty-cell battery, measured with a W. B. dead-beat milliampèremeter.

cheaper, might answer quite as well, except where there is a decided lithæmic or gouty condition.

By cataphoresis, or electrical osmosis, are meant the movements of liquids or solutions from one electrode toward the other, through animal tissues, under the influence of a galvanic current. Munk,[1] nearly twenty years ago, demonstrated the transmission of a solution of sulphate of quinine through the skin when electrodes were moistened with it, and detected quinine in the urine twelve hours after the passage of the current. Von Bruns proved that iodide of potassium could be passed through the body, whether alive or dead, in a similar manner. In the same way strychnine, cocaine, and bichloride of mercury have been made to traverse the tissues, or technically, have been driven through the skin. Adamkiewicz has employed chloroform in this manner in the treatment of neuralgia, and claims extraordinary success with it, in many cases giving immediate relief.

Where it is desired to introduce a considerable quantity of a medicament, the method of Munk should be followed. He took two of Dubois's conducting tubes, stopped with plugs of clay. Both the tubes were filled with a saturated solution of the substance to be introduced, and the plugs were moistened with it. These were then applied to the body, and currents of moderate strength passed through the parts in the same situation. Their direction was reversed every five or six minutes, because it was found that the activity of the process diminishes with the continuance of any one current. For the same reason it is necessary to charge both electrodes with the substance used. Erb[2] states that in this manner it is possible to introduce a considerable quantity within the system in a period varying from fifteen to forty-five minutes. Strychnine cramps have been produced in the rabbit, and in man traces of iodide of potassium and of quinine administered thus have been found in the urine hours afterward.

[1] Archiv. für Anat. u. Physiologie, H. 5, 1873.

[2] Electrotherapeutics. Von Ziemssen's Handbook of General Therapeutics, vol. vii. p 127. New York: Wm. Wood & Co., 1887.

With regard to the treatment of new-growths by electrolysis, we are familiar with the treatment of hypertrophied scars and keloid, and the removal of similar inflammatory deposits giving rise to stricture of the urethra, rectum, etc. In this connection, I would also refer to Apostoli's treatment of uterine fibroids, which in many cases has obviated the necessity of a resort to the knife. Dr. Garrett, of Boston, reported last year the successful treatment of 157 cases of tumors of the breast by the aid of galvanism. It seems to me that the combination of the two methods, cataphoresis and electrolysis, opens an inviting field for exploration for both physician and surgeon.[1] Possibly we may look for the successful treatment of malignant growths in this combined method. It certainly offers a more promising outlook than any surgical procedure with which I am acquainted.

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## DISCUSSION.

Dr. Charles K. Mills: I have had some little experience with cataphoresis, principally in the application of chloroform with the electrode devised by Adamkiewicz. I have treated perhaps a dozen patients in this way, chiefly cases of neuritis and neuralgia. In some instances a certain amount of success has attended the use of this electrode, but I have not been able to assure myself that the success was greater than after the use of the ordinary electrode without the supposed cataphoric action.

This is not a new method of treatment. One of the methods of using the frictional or influence machine which was employed by Burq, of Paris, to whom we are largely indebted for metallo-therapy, was by the use of what he called an applicator. This applicator was used with the frictional machine, certain medicaments being applied to the patient's body by means of it.

[1] By placing the electrodes moistened with iodide of lithium in starch water, the iodine reaction is quickly manifested at the positive pole, with a current of from two to five milliampères. It is possible that where morbid growths are superficial or merely subcutaneous, and the skin thoroughly wet with the iodide solution, electrolysis may take place directly among the cell-groups, and thus expose them to the action of nascent iodine, with results not to be obtained in any other way. It is within the limits of possibility that we may soon discover the chemical agent—chlorine, bromine, arsenic, acetic acid—which is especially obnoxious to the abnormal cell-growths of carcinoma, which Formad claims is a kind of inflammation. When this occurs medicine will achieve a triumph over surgery.

I doubt if much medicine is introduced into the system by this method, although, as Dr. Woodbury has stated, it is possible to do this. The greatest claims have been made for chloroform applied in this way, though but little is carried through the skin to the nerve-tissues. One of the best applications in the treatment of local neuritis in the chronic or subacute form is inunction of mercury and iodine, or mercury, iodine, and belladonna. It being accepted as proved that medicine can be more promptly introduced by the aid of the galvanic current, if we could introduce such remedies by cataphoresis along the line of chronically inflamed nerves we might have a more prompt effect. I have had no experience with the use of the current in the treatment of tumors in the manner spoken of by Dr. Woodbury.

Dr. Woodbury: I think that it must be evident that at the present day physiological chemistry is assuming a very prominent position in practical medicine. It offers the solution of many pathological questions. For example, it is probable that a certain molecular constitution, a certain definite combination, may be taken to represent the body in a state of health. Certain chemical elements are necessary to the structure of the body, and an arrangement of these elements in a particular, though very complex, way is essential to a state of health. Thus, health might, in one sense, be represented by a graphic formula, as in chemistry. This, however, I need not go into. I shall simply say, that as we have seen in lithæmia, uræmia, and a number of other conditions, that the presence of abnormal compounds or the accumulation of nitrogenous waste in the body gives rise to disorder, so we see in certain zymotic conditions that the presence of bacteria in the tissues gives rise to certain chemical substances which disturb the general health. It has been asserted, but yet remains to be proved, that carcinoma is due to some form of bacteria. Dr. Formad claims that it is a variety of inflammation. Inflammation, we know, is a zymotic affection. Now, if a certain chemical formula of the tissues represents health, and a departure from this represents disease, it is conceivable that by the carrying of certain remedies or agents directly to the affected tissues, we may antidote the disease at its source, and restore the part, and the body, to health.

I have spoken of carrying solutions of substances from one part of the body to another, but I did not refer to the process of electrolysis which occurs in a compound solution like iodide of lithium. I have found by experiment that a current of two milliampères is sufficient to cause the electrolysis of iodide of lithium, the iodine going to the positive pole. If we apply the positive pole directly to the affected part, especially when the skin is the seat of disease, the skin and both electrodes being moistened with the medicament, the iodide of lithium is carried through the tissues, the iodine being attracted to the positive pole. We then have the iodine in its nascent form attacking the cell-elements. It seems to me that this idea of having a nascent chemical agent liberated at the seat of disease gives us a peculiarly advantageous method of treating new growths—it certainly does in the case of

superficial or subcutaneous syphilitic new growths. It seems to me that it might also be useful in malignant growths. At some future day we shall have more experience, and we may be able to determine exactly the agent which will antidote the peculiar poison giving rise to the malignant growths, except in those cases where there is congenital inclusion or transposition of tissue-elements, giving rise, in after-life, to tumors.

# ON THE CONTRACTION OF THE HEART AND ORDINARY STRIATED MUSCLE.

By THOMAS J. MAYS, M.D.,

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[Read May 7, 1890.]

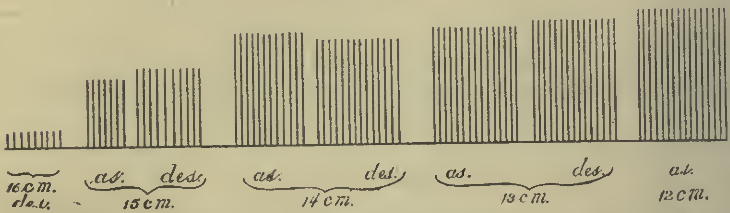
THE work on which the remarks of this paper are based was performed by myself in Professor Kronecker's laboratory, and under his direction, during the winter of 1882 and 1883, and a preliminary report of the same was published in the *Verhandlungen d. physiologischen Gesellsch. zu Berlin*, Jan. 12, 1883. And although no efforts have been made since then to push the investigation further, I desire to present it to the College to-night for the purpose of considering its bearing on the general question of muscular contraction more fully than was possible in the prefatory announcement already made.

It is well known that under certain conditions the degree of contraction of a skeleton muscle varies with the strength of the stimulus which is applied to it. In other words, the more intense the stimulus the higher and longer will the muscle-curve become. Thus in the following diagram, which is copied from Dr. Brunton's work on *Pharmacology, Therapeutics, and Materia Medica*, p. 121, it is shown that a weak electric stimulus of 15 cm. distance between the primary and secondary coil of the induction apparatus produces a lower contraction than if the stimulus is increased to 12 cm., 13 cm., or 14 cm. distance between the two coils.

Since the investigations of Bowditch, Kronecker, Stirling,

and others into the nature of cardiac contraction, our works on physiology teach that the heart differs widely in its mode of contraction from that of a striated or skeleton muscle. Thus Landois states (*Lehrbuch der Physiologie des Menschen*, 3te. Aufl. 1883, p. 111) that in the case of the heart " the feeblest stimulus

Fig. 1.




Tracing of the contractions of a muscle with stimuli of varying strength. The numbers indicate the distance in centimetres of the secondary from the primary coil in the induction apparatus. As. and Des. indicate the ascending and descending direction of the current.

which is capable of calling forth a contraction acts like the strongest—the most complete or maximum contraction being, therefore, induced by the weakest or minimum stimulus." In Hermann's *Handbuch der Physiologie* (Band 4a. S. 350) Aubert, writing on the rhythmic movements of the heart, says that on stimulating the frog's ventricle with different intensities of the induction current, Bowditch always found that the stimulus which produced a contraction at all provoked a maximum contraction.

Dr. Stirling, the translator of Landois's *Physiology*, says (vol. i. p. 120, 1886):

"It is quite clear, therefore, that the relation of the strength of the stimulus to the extent of the contraction of the cardiac muscle is quite different from what occurs in a muscle of the skeleton, where within certain limits the amplitude of the contraction bears a relation to the stimulus, while in the heart the contraction is always maximal."

The stimulus which produced a cardiac contraction at all gave rise to the fullest and most complete contraction, and therefore a maximum is not better than a minimum stimulus. The cause for this diversity of behavior is supposed to be

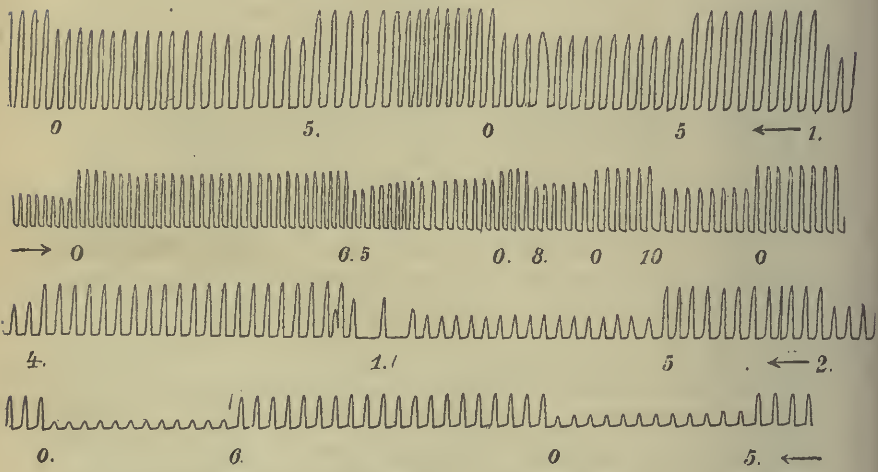
inherent in the structure of the heart-muscle itself. Thus Aubert (Hermann's *Handbuch*, Bd. 4a, p. 348) states in substance that in view of these anatomical developments concerning the cardiac nerves it must be admitted that the muscular elements of the heart partake of the function of nerve fibres, and that on account of these anatomical variations the heart differs in its function from that of other striated muscles. In the abstract it is very difficult to see why such a manifestation of contractility should prevail in the cardiac and not in a voluntary muscle; although under ordinary circumstances there can be no doubt concerning its existence, as anyone who has devoted much attention to the physiology of the isolated heart can testify.

During the first month in which I was engaged in studying the influence of pure and diluted blood on the frog's heart this characteristic action always displayed itself in its accustomed manner. Toward the end of this period I found, or at least thought I found, evidence that this organ manifested a tendency to respond to maximum and minimum electric stimuli, by giving slight differences in the elevation of its tracings. This took place at first only when the blood in the heart became more or less wholly carbonized, as always happens toward the close of an experiment of this kind. So soon as the heart was refilled with fresh blood, and was sufficiently revived, not a trace of this difference could be observed, and hence it seemed very probable that if the heart were filled with blood which had been kept for some time, and which had therefore undergone spontaneous carbonization, these pulse variations could be made to reappear. This was done and the assumption was verified. In a short time I became able so to adjust the relationship between the heart and its blood-contents as to call forth these pulse differences at will, as is demonstrated by the following tracings:

Now, why did previous investigators come to the conclusion that a fundamental difference existed between the contraction of the heart and a skeleton muscle? This, I believe, is due in the first place to the greater irritability of the heart muscle,

and in the second place to a lack of refinement in our experimental methods—*i. e.*, the method which is adapted for stimulating ordinary striated muscle is not specially applicable in the case of the heart. There can be no doubt that the effects

Fig. 2.




Tracings representing the contractions of the frog's heart when stimulated by opening induction shocks every four seconds. The figures below the tracings indicate in cm. the distance between the primary and secondary coil of the induction apparatus. The arrows point out the direction in which the tracings are to be read.

of a maximum and a minimum stimulus are alike so far as customary experimentation on the heart is concerned, but I think my experiments demonstrate that this does not reveal the true nature of cardiac contractility.

First, then, as to the greater irritability of the heart. Repeated experimentation has taught me that so soon as this is reduced, which may be done either by allowing the heart to work until it becomes fatigued, or by filling it with blood which has been standing in a cool place for forty-eight or seventy-two hours, the difference in the pulse-elevation appears; or this may develop, too, if the heart is well exhausted and then filled with fresh blood. I often found that it took a long time to subdue a very irritable heart to the point where

it showed these differences—often requiring to be filled and fatigued three or four times in succession before this took place, and even when this occurred, if, for some unaccountable reason, the irritability of the heart rose again, this phenomenon disappeared or was lost to a great degree.

While, then, as a rule, it is necessary to blunt the irritability of the heart before this pulse difference manifests itself, it is also true that once in a while a heart is met in which this appears in the fresh or normal state, and from the very beginning of the experiment. Of such hearts, however, I only found one instance in my experiments. Its irritability was low at the outset, but grew during the experiment, yet the pulse difference remained throughout. It seems that when this property of producing pulse variations is once thoroughly developed it will generally remain until the heart is wholly disabled.

That this whole matter resolves itself into a question of irritability is still further substantiated by the fact that when the irritability of a voluntary or ordinary striated muscle is exaggerated, it loses its power of differential response to maximum and minimum stimuli, and behaves precisely as the heart muscle does under ordinary circumstances. Thus the experiments of Wundt[1] and of Walton[2] show that during strychnine poisoning "a stimulus which is strong enough to produce any reflex contraction in a muscle produces a maximum contraction, and the muscle will not react more strongly if the greatest possible stimulus is applied. The range of stimuli through which the contraction varies with the intensity of the stimulus, becomes shorter as the effect of the poison increases, and when a certain grade of poisoning is reached the step is infinitesimal from a stimulus which produces no contraction to one which produces a maximum." (Walton.)

When irritability is viewed, therefore, as it exists normally in voluntary muscle, it is seen that varying degrees of contrac-

[1] Untersuchungen zur Mechanik der Nervencentren, 2 Abtheilung, S. 70, ff.

[2] Reflex Movements of the Frog under the Influence of Strychnine. Journal of Physiology, vol. iii. p. 308.

tion are obtained from this organ when varying degrees of electric stimulation are applied to it; but this differential responsiveness vanishes so soon as its irritability is increased through the influence of strychnine. Now the irritability of the normal heart I regard as being analogous to that of voluntary muscle under the influence of toxic doses of strychnine, for here, in virtue of the heightened irritability of the heart, the degree of electric stimulation which provokes a cardiac contraction at all is too powerful to produce anything else than a maximum contraction. It seems probable, then, that if, instead of blunting the irritability of the heart through fatigue, as had to be done in most of my experiments, the grade of the induction current between the point which gives *no* contraction and the point which gives *a* contraction, were attenuated more finely than that which the ordinary induction apparatus affords, the heart would respond as readily to maximum and minimum stimuli by giving out maximum and minimum contractions as is the case with voluntary muscle.

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## DISCUSSION.

Dr. Henry Hartshorne: This subject so especially belongs to those who are engaged in physiological experimentation and are familiar with its recent progress, that I do not feel competent to say much upon it, and what I have to say is rather interrogative and somewhat aside from what appears to be immediately relative. I have been led in my thoughts on the subject largely by the title of the paper as announced—"Is there a Fundamental Difference Between the Contraction of the Heart and that of Striated Muscle?" It seemed to me that the first question is whether or not the heart muscle is itself a striated tissue, as it has been commonly called? That is a histological question. Here, as elsewhere, physiology and histology are best studied together. The statement has been made that by strong acetic acid the striæ could be made to disappear. I presume that there is no doubt that this can be done, but there is good evidence that when such results occur, they are due to a destructive action. It seems to be shown that the difference between the muscular structure of the heart and smooth muscle is decided. The striæ are something more than transitory superficial lines. The heart is really composed of distinctive cell forms. Weissmar found that in different classes of animals there is a difference, and he asserted that in the frog, and

also in lizards and fishes, there are fusiform fibres which are striated. As we pass to the higher animals the striæ become more marked.

To be as brief as possible, I will say that the proof of the cell-structure which is an essential part of striated muscular tissue, is clear as regards the heart muscular tissue; that there are anastomoses is important; these cells with intervals between them nevertheless have lateral communications. The absence of sarcolemma and the scantiness of connective tissue are important. That the intervening material between the cells is different from the cells is shown by Bruck's experiments with polarized light. These showed that while the cell substance is doubly refracting, such is not the case with the intervening material.

There is, again, confirmation to some extent from pathology. In Rindfleisch's *Pathological Histology* is given an account of the examination of a heart in which there was diffuse inflammation of the muscular tissue. Rindfleisch's description as it bears upon this question is in brief that "the muscular fibres were collectively divided by cross rents into short parallelograms, a phenomenon which we frequently meet with in the pathological histology of striated muscles." This remark was entirely apart from any physiological consideration. Supposing it to be the case that we have a certain difference between the heart muscular tissue and other striated tissue, it still seems to me that the two are essentially identical. The heart-muscle is intermediate between involuntary muscle and voluntary striated muscle. Such transitions are said by Küss in his *Physiology* to occur in the muscles of the tortoise. The construction of the muscle of the heart is peculiar in the absence of sarcolemma, in the presence of lateral anastomoses, which are rare in smooth muscles, and in the presence of ganglia.

The heart is an organ entirely unique. It is the only organ in which the muscle is the organ. The bladder and the uterus both have muscular tissue, but they differ in important respects. The ganglia permit a correlation of the different parts of the heart, and the lateral anastomoses make that very complete. This is also favored by the absence of sarcolemma. All these things help to make the heart a unit in action. This arrangement must produce an economy of irritability. It seems to me not so much an increase of irritability, as an economy of it, so that every stimulus takes effect upon the whole heart, which is not true of other muscles. When stimulation is applied to a voluntary muscle, it does take some effect throughout the muscle, but the complexus of effect must be greater in the case of the heart than in any other muscle; and this seems to account for what has been mentioned by Dr. Mays, that even slight stimulus will produce a complete contraction as well apparently as a maximum one. That the irritability may be greater I would not pretend to deny, but it is possible that the construction of the heart for economy of irritability may have much to do with it.

As to the evidence in regard to the amount of contraction, I would ask whether there is not this difference of some importance, that while the mus-

cles of movement have a kind of action which is measurable by graphic arrangements, the heart in its normal action is under a condition of required opposition or resistance. I think that it has been shown by Blasius that the greatest work of the frog's heart is done under a resistance equivalent to 35 mm. of mercury. In Dr. Mays's experiments we have very little resistance. If such resistance were present, and it were possible then to measure the work done, it might be found that there was a difference in the amount of work done under a maximum and under a minimum stimulation.

Dr. Mays: I do not know that I have much to add to what I have already said. I never could understand why it was that the heart should always make a maximum contraction under any degree of stimulation while in the skeleton muscles we have just the opposite, although this has hitherto been shown to be true. We know that in the higher animals the heart bears a close analogy to the striated muscles, but this does not hold so well in the lower orders of animals. But I have not dealt with the heart so much from a histological as from a physiological standpoint. I think that this experiment has a certain bearing upon the action of the human heart. The question is whether the heart in all conditions of health or disease, in standing, sitting, or lying, makes a full and complete contraction, or whether it merely becomes slower in its action. We must consider that in these experiments the conditions are different from what they are in the body, but I think that if we can with these crude experimental methods get a maximum and minimum contraction from the heart and skeleton muscles, we should suppose that the same would hold true of the heart muscle at least under certain conditions. I think that I have demonstrated this by these experiments, although they have not been carried as far as I expect to carry them at some future time.

# THE TREATMENT OF FLAT-FOOT AND ACQUIRED VALGUS.

By G. G. DAVIS, M.D., M.R.C.S.

[Read June 4, 1890.]

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Flat-foot, or sinking of the arch with a tendency to eversion and the production of a valgoid condition, is a comparatively common affection, and its management is sometimes so troublesome that I desire to present an outline of the treatment which in my experience has been the most satisfactory. In formulating a plan of treatment for any affection we should first consider its pathology, and, if possible, deduce our methods therefrom.

According to the various views held as to its etiology, the cause has been ascribed to the muscles, cartilages, and joints, bones, or to a general weakness of the system which renders the foot unequal to such demands as are made upon it.

Duchenne, regarding the trouble as a paresis of the peroneus longus muscle, advised electrical treatment directed to it. Gosselin considered, from the pain and changes in the articular cartilages, that the trouble was inflammatory in nature and proposed the name "Tarsalgia of Adolescents" for it. Hüter and Henke attributed marked importance to the osseous changes which occur in the affection. Mr. Lane (*Guy's Hosp. Rep.*, 1887) attributes the cause in children to "a general want of tone and vigor," and lays considerable stress on the position of the foot as a cause of the affection. Royal Whitman (*Trans. Am. Orth. Assoc.*) adopts the same view, and still more particularly directs attention to the position of the foot in walking

and resting as a causative agent. He states: "As flat-foot must cause the walk of weakness, so an approximation to the attitude and walk of weakness may induce flat-foot." Muscular weakness and faulty position are considered the two causative factors.

The tendency of late years has been to regard a more or less condition of general weakness, with lack of muscular tone and relaxation of the ligaments, as the primary cause of the trouble, and the superimposed weight of the body as the exciting one. It is no longer regarded as an affection of a single muscle or joint, but of nearly all parts of the foot and leg that are involved in sustaining the body-weight. These are probably the true causes of the affection. It is seen most frequently in youths and young adults whose general health is somewhat impaired and who lack muscular tone. When such subjects are required to be on their feet a great deal they are very liable to develop flat-foot. In rare cases, rheumatism is a distinct cause. I am inclined to regard general weakness as the most common primary cause, and not, as Dr. Whitman suggests, a faulty position of the foot. Of course, in paralytic cases, faulty position can produce all sorts of deformities, but it is certainly exceptional for it to do so in a healthy member. For that reason I consider the weakness, both muscular and ligamentary, but principally the former, as the starting-point of the trouble. The plantar arch has been divided by Lorenz into an external part composed of the calcaneum, cuboid, and fourth and fifth metatarsal bones, and an internal part composed of the astragalus, scaphoid, three cuneiform, and first three metatarsal bones. He is inclined to attribute more importance to the external part than other writers; but it is so low and is so well supported by the soft parts beneath it that when the foot is placed flat on the ground its external border touches, so that if the external arch is destroyed it can hardly get any lower than it normally is, but is rather inclined to rotate outward. In treating the affection he endeavors to support the external portion of the sole by placing a pad beneath it. Believing as I do that the condition, as affecting the

external arch, is more of a rotation than sinking, I prefer directing treatment to prevent the former rather than the latter. The principal changes, however, involve the internal arch. This is kept in place and supported by the muscles of the leg attached to the sole of the foot, by the short flexors proceeding from the calcaneum forward, and by the ligaments binding the bones of the tarsus together—principally the long calcaneo-scaphoid and the plantar aponeurosis.

There can be little doubt that the muscles of the leg, from their peculiar arrangement, give considerable support to the arch. On the external side the peroneus longus crosses the sole to attach itself to the head of the first metatarsal bone, and on the inner side the tibialis posticus goes forward to be attached to the second and fourth metatarsal bones, beside sending expansions of its tendon to the bones of the tarsus and fibrous tissues covering them. This muscle, together with the flexor communis and flexor longus pollicis, passing beneath the sustentaculum tali to be attached forward, also aid in supporting it. The peroneus longus and tibialis posticus, from their peculiar method of crossing the plantar surface—one from the inner and the other from the outer side—form a kind of sling in which the arch is supported. The arch of the foot receives so much support from the muscles that we can easily see that a weak and enfeebled condition would deprive it to a considerable extent of their support, and the weight of the body would have to be borne principally by the bony and ligamentous structures.

The ligaments, also, sharing in the general lack of tone, are unable to bear the strain, and we have them stretching, the astragalus and scaphoid sinking, and the foot rotating outward at the sub-astragaloid joint. Pains are experienced at various parts of the foot, sometimes by stretching and at others by compression of the tissues. As the arch sinks the bones become jammed together, the metatarsus becomes abducted, and the foot loses the flexibility it possesses in health. The constant irritation often produces spasm of the peronei muscles and sometimes of the extensors, as well as hypertrophies and

exostoses of the bones and alterations in their articulating surfaces. Pain, with inability to stand or walk with comfort, is what usually causes these cases to apply for treatment.

Considering the question of treatment in the light of the above facts, we should endeavor to remove the causes. Attempts should be made to improve the general condition of the system by such means as attention to the diet, habits, and mode of living of the patient. Tonics, moderate exercise, and as much out-of-door life as possible, with perhaps a trip to the seashore, will all aid in accomplishing this. Fatiguing occupations, requiring close confinement or excessive strain on the feet, should be avoided. The local treatment will vary according to the severity of the case.

Massage of the foot and leg is useful in all cases. Passive movements of the foot should be made by having it worked backward and forward and twisted inward, while pressure is made upward on the sole. This tends to restore flexibility to the foot, to unlock the bones and restore the fallen arch, and also to stretch the contracted peronei muscles. Electricity is also to be recommended in order to improve the muscular tone.

The deformity is to be removed as much as possible by the above means, and then prevented recurring by supporting the weak plantar arch. We are now speaking of those cases in which it is possible to restore the arch by manipulation while the patient is off his feet. There are several ways of supporting the arch. Some prefer using a light arched steel plate or spring, fastened to the sole of the shoe. Dr. A. S. Roberts advocated one form of this. Others use an elastic strap, coming up the inner side of the sole to be fastened to a brace, as in the boots of Nyrop and Walsham; others still prefer the use of some unyielding substance or pad, fastened to the sole of the shoe to prevent any possibility of the arch becoming flattened.

The use of elastic means of support, whether from flexible steel plates or straps, does not seem to me quite to fulfil the indications, unless they are very stiff. The weight of the body still causes the arch to sink somewhat and the deformity to reproduce itself. The inelastic steel arch suggested by Dr.

Royal Whitman is undoubtedly efficacious, but it is quite troublesome and difficult to prepare.

For mild cases, particularly in children, where only a moderate amount of support is desired, this is most conveniently obtained by having a shoemaker construct a shoe with its sides stiffened with leather and the sole built up on the inside of the shoe, so that the arch of the foot is supported in its entire length. When skilfully made these shoes are very comfortable, and, if the disease is not too pronounced, are quite satisfactory. Elevating the inner edge of the sole also adds to their efficiency. When, however, the affection is more marked, particularly in the older cases where there is a marked tendency to eversion, then a firmer and more secure support is needed. A support to the arch by building up the shank of the shoe is still necessary, but, in addition, a steel plate is inserted in the sole and attached to it are the side-irons going up the leg and hinged at the ankle-joint. This will prevent any tendency of the foot to eversion. In order to prevent the inner side of the shoe giving way under the pressure of the weakened arch it is supported by a thin steel plate about an inch wide, which is fastened below to the steel plate in the sole of the shoe and comes upward in front of the internal malleolus. The object of the side-irons is simply to keep the foot level by preventing the sole-plate from rotating outward. If it is desired to make the apparatus very light, a single side-iron may be used. It is then placed preferably on the inner side.

In those cases in which pain is marked with sometimes accompanying spasm of the peronei muscles it is not desirable to apply the apparatus and allow the patient to go around at once. It is better to confine the patient to bed and prescribe massage. In a severe case, I would even encase the limbs in a removable plaster dressing, like the Bavarian splint, which can be taken off when it is desirable to apply manipulation to the feet. Under this treatment the spasm of the muscles ceases and the foot is in a more favorable condition for the apparatus. Tenotomy of the peronei muscles, as practised by Dr. Goodman

for many years, and advised by Barwell, may also be desirable in some cases.

The treatment described so far is applicable to those cases in which by manipulation we are able to restore the fallen arch and the foot approximately to its normal shape. When, however, the affection is of long standing, changes occur in the bones and ligaments which prevent the reposition of the arch by manipulation only, even though the effort is made while the patient is under the influence of an anæsthetic; and it is in these cases that a resort to operative procedures is to be advised.

It may be thought that having recourse to an operation on the bones for this affection is too radical a measure, but when we consider the maimed and deformed condition of the parts and the pain and interference in their use, together with the safety of the procedures proposed, we cannot feel any hesitancy in urging its performance in suitable cases.

The operation suggested by Ogston is the one which is usually performed. He recommended making an incision over the astragalo-scaphoid joint, then denuding the adjoining bony surfaces of their cartilage, chiselling away the bony prominence at the lower portion of the head and neck of the astragalus, then pushing the arch up and back into its former position, and, by means of a couple of ivory pegs, nailing them together. This operation seems to me far more rational than that of removing the scaphoid bone entirely, as recommended by Mr. Davy and Golding Bird. Its removal would leave a gap of such extent that it could hardly fail to weaken the foot; at all events, it does not promise the same firm reposition of the arch that Ogston's operation does.

Believing as I do that the causes which lead to the affection and perpetuate it are largely due to loss of tone of the various tissues, and that they are only temporary in character, if we can succeed in restoring and maintaining the arch until the system is reëstablished, we will then have our patient cured. So that I do not believe it necessary actually to make the astragalus and scaphoid bones consolidate firmly with bony union in order to remove the deformity and alleviate the pain.

The most difficult part of Ogston's operation is the satisfactory insertion of the ivory pegs. Inasmuch as I do not believe in the necessity of their use, and as their presence tends to increase the chances of suppurative complications, I have modified Ogston's procedure by omitting them. When trouble is anticipated from pressure on the prominent tuberosities of the head of the astragalus and also of the scaphoid bone, I would advise their removal at the time of the operation. Should this not have been done, the inner surface of the foot can be protected from pressure by moulding to it a piece of thick sole leather which has been softened in water and in which depressions have been cut to receive the projecting bony points. The rim of this piece of leather should be bevelled off, so as not to have a thick edge, or it itself will cause discomfort. This should be retained in position by a few turns of bandage until it has dried and hardened.

The after-treatment of the case consists in continuing the general treatment and massage and maintaining a careful supervision over the apparatus to see that it is kept in good condition and that it fulfils its object. The importance of this is apparent to all who have had any experience in orthopædic surgery.

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## DISCUSSION.

Dr. De Forest Willard: I am glad to know that others besides myself have difficulty in having their ideas carried out by the instrument-makers.

Flat-foot is one of those conditions which, even in a slight degree, give a great deal of discomfort; and, in its extreme degree, disables the patient, renders him miserable, and prevents him from earning a livelihood. It is, therefore, important to consider it, and it is a difficulty which is a complex one. As I have seen it, the muscular element is exceedingly important, particularly the relaxation of the tibialis anticus. This permits sagging of the arch, which is followed by lengthening of the plantar ligaments. The bones, instead of presenting smooth facets, are tilted upon each other, thus causing extreme pain. As this goes on, we have the extreme degree, producing, finally, rotation and eversion, with valgus, which is so commonly the result.

I have treated the different grades in different ways. I have tried nearly

every form of support. Years ago I attempted to build up beneath the inner side of the arch with cork or leather, but, unless I saw personally in regard to each individual case, the arch was not properly supported. Then I tried pure rubber-gum, which, I think, was more comfortable. I now occasionally try this when the steel spring or other support fails to give relief. A little mountain of gum, if it can be properly cut, does very well. The steel springs which Mr. Albert Lea first introduced, have been more satisfactory than anything else, and I have fallen into the habit of using them. They support the entire inner portion of the arch and also give lateral pressure. They will, however, rust and break, and will not last more than three or four months; but their life is about the same as that of the ordinary shoe, and they are not very expensive. Being applied inside an ordinary shoe, they are entirely out of sight.

In addition to these measures, it is important to bring the foot into a position of partial varus. I have the whole inside of the sole and heel raised one-third of an inch higher than the outer side, and this causes the patient to walk, as it were, on the side of a hill.

Besides supporting the arch, the foot must be brought into proper position, first, by increasing the muscular tone by massage and electricity and by gymnastics of the foot. Making the patient walk upon the heel and toes gives additional force to the muscles.

For fixation I prefer the application of plaster-of-Paris. After the foot is forced into internal rotation and the arch is lifted up, the plaster is applied, and removed once or twice a day to permit of the use of massage and gymnastics.

In bad cases, where we have rather a condition of valgus than of flat-foot, I think the addition of side steel uprights to the already described apparatus is important, but, in the minor cases, they are not essential; and in my experience, the raising the shoe on the inside and the support of the arch are most beneficial.

As to operative interference: in minor cases I should not consider it proper; but in the severe grades I believe that it is sometimes indicated, where the affection is such as compels the patient to walk upon crutches or prevents locomotion. In such cases the operation which tends to make the arch rigid and give increased strength is justifiable. The support should be just as accurate and as long continued after operation as when operation is not done. It must be continued for many years, until we have absolute surety of ankylosis.

Dr. James Young: I wish to call attention to the different springs which have been employed. I have here the steel spring, the objection to which is that it rusts. To obviate this numerous materials, as coatings, have been tried. Silver, nickel-plate, and aluminium have been employed. Phosphor-bronze has also been used, but this quickly corrodes. Nickel-plating quickly peels off. I have tried vulcanized rubber. It was at first thought

that hard rubber might prove brittle, but such was not the case. It, however, from the heat of the foot, soon sinks down and fails to support the arch. The most perfect spring is one of hard steel covered with hard rubber, similar to what is used in trusses. This has given satisfaction. An outline or cast of the foot is taken, from which the steel spring is made and then covered with hard rubber. I have had no experience with the operation advocated, but several severe cases which I have had yielded readily to the employment of a spring. In severe cases, I should be inclined to adopt forcible restoration of the foot under anæsthesia.

Dr. William Barton Hopkins: I think the colored race presents a notable exception to the rule laid down by Dr. Davis, that flat-foot belongs to rather delicate subjects with relaxed muscular systems, as I have met with a great many cases in negroes in whom not only was the muscular system well developed, but whose ligaments were set and sufficiently tense. Indeed, in them it may be regarded almost as a race peculiarity, just as the reverse is an acquired race peculiarity of the Chinese, whose feet are so cruelly distorted by binding. As was well shown in some skeletons of Chinese feet exhibited by Dr. Harris here, the deformity consists in an approximation of the heel with the toes, which causes an exaggeration of the arch of the foot by elevating the tarso-metatarsal joints. The result of this extreme metatarsal flexion is to shorten the foot from heel to toe, but not to shorten the bones of the foot. In conjunction, therefore, with the methods in common use for overcoming slight degrees of this deformity, *i. e.*, the elevation of the inside of the heel a quarter of an inch and the inside of the sole an eighth of an inch, and the use of a steel spring in the sole of the shoe, I recommend the use of a stout laced shoe so adjusted as to bring the antero-posterior support between the heel and the lower portion of the instep, which to some extent draws together the bases of the arch.

# ORCHITIS MALARICA.

## Extract from the Report of the Royal Medical Academy of Rome, 1889–1890.

By COMMENDATORE GREGORIO FEDELI, M.D.

[Read June 4, 1890.]

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Among the editorial articles of the *Lancet*, October 20, 1888, there appeared one with this title—Orchitis Malarica, an abstract from the *Revue de Chirurgie*, by Doctor Charvot, Surgeon in the French Army at Tunis.

Charvot writes: Among the various phenomena noticed among sick soldiers who are deeply saturated with malarious poison one perceives an especial and interesting form of inflammation of the testicle. It is a malady very rare even in countries where malaria is common. There is no record of such a malady in medical books, says the English writer, including that of Mr. Curling, which treats especially of diseases of the testicles. It seems, then, that Charvot has been the first to describe such cases, verified among the soldiers of the French army during the occupation of Tunis.

The first characteristic of orchitis malarica, continues Charvot, is that it develops itself in those who have long suffered from serious malarial fevers. The inflammation manifests itself during the attacks of the fever, often in the night, not occasioned by external causes, urethral fluxes, etc. The inflammation is of an acute type. In a few hours the whole member is swollen, reaching its maximum in two or three days, then slowly diminishing.

In some cases the local inflammatory phenomena have undergone daily exacerbations, and remissions in connection with the temperature of the body. The body of the testicle, as well as the epididymis, is involved in the inflammation, and theer is effusion into the vaginal membrane. The skin of the scrotum is not affected. Only rarely it adheres to the tissue below it, although there may be inflammatory œdema of the cellular tissue of the scrotum. Ordinarily the pain is intense, radiating from the testicle to the groin and loins. Discomfort, headache, neuralgia, pinched face, and anæmia, all signs of serious malarial poison, accompany the course of the malady. Under antipyretic treatment the pain and the inflammatory œdema soon diminish; but the absorption of the exudation caused by the inflammation of the testicle takes place slowly, and is followed by more or less atrophy of the secreting substance of the gland. And that which is important to notice is that orchitis malarica is usually followed by atrophy of the testicle more or less complete.

The curative treatment of this form of orchitis, says the author, is fortunately not difficult. A large dose of quinine should be given a few hours before the increase of temperature, and this should be repeated daily until the patient is entirely and constantly apyrexial.

The salutary effect of the antipyretic treatment is quickly perceived in the lowering of the temperature, the abatement of the local pain, the diminution of the scrotal œdema, and of the other prevailing symptoms. If the remedy does not lose its effect, the swelling of the testicle is modified, it becomes softer, the sensibility is allayed. No local treatment is really necessary.

The fever, which is always associated with orchitis malarica, is not symptomatic. It often precedes, but the inflammation of the gland is not in any degree in proportion to it. Finally, it yields to antifebrile treatment, and much sooner than happens in cases of other orchitis. So says Charvot, and for the sake of brevity I omit his other remarks.

At a meeting of the Academy I mentioned what I had read

in the English medical periodical, especially asking our honorable President, who is Professor of Clinical Medicine, whether he had happened to observe similar cases, as I did not remember to have met with such, either in my hospital or private practice, still less to have found any record of them in medical literature. His reply, and that of the other academicians present, was negative.

Toward the end of June, however, I had the opportunity of verifying the above observations in the case of a young English gentleman, whose home was in India, and who was passing through Rome on his wedding journey, on his way to his native country.

Called in to prescribe for his young Indian wife, who was affected by disorders caused by the discomforts of her voyage, and her change of condition, I was impressed by the orange-yellow color of the husband's face, as well as by the sufferings of the wife. He was agitated, anxious, frightened about his wife's condition, much more than the case required; and, although every time I visited her I tried to reassure him with regard to her speedy cure, still nothing availed to calm him. Observing in him the daily augmentation of the orange color of the skin and of the conjunctivæ, I insisted upon advising him, as I had done before, to be calm, and also to use proper remedies.

He did not take this advice until his strength failed in consequence of a relapse of malarial fever, with the proper symptoms of which were associated pain and swelling of the right testicle. Then he consulted me. Interrogated as to his past state of health, he told me that having been for many years in India, in the capacity of lawyer, I do not now remember in what city, he had been from time to time attacked by marsh fever, endemic in the city where he resided, which had recurred from time to time, although he had not failed to procure regular medical treatment. In consequence of these relapses, besides the regular symptoms of the malarial fever, the description of which I omit, there had developed pain and swelling of the right testicle as at present. In fact, from the examina-

tion of the patient it clearly appeared that he was affected with marsh cachexia, with engorgement of the spleen and liver; also with swelling of the right testicle, accompanied by pain, which extended from the groin to the loins. And these sufferings were increasing under the effects of fever; although in this case of mine, not with the appearance of a really acute process, as Charvot observes.

The orange-yellow color which pervaded the whole surface of my patient's body, the almost entire absence of pain in the viscera affected, the specific urine, etc., taking into account the chronic marsh infection in the period of cachexia, made me also think there was beginning in him a degenerative, amyloid process of both the viscera; all the more, because, although he was endowed with a healthy constitution, he appeared to be of a lymphatic temperament. Undoubtedly chronic miasma in the period of cachexia might produce the amyloid degeneration of the above-mentioned viscera, especially when the marsh infection dominated endemically in a warm or tropical zone.

Remembering what Charvot had written, the diagnosis of orchitis malarica seemed clear to me; as well as a degenerative process of the liver and spleen. I prescribed generous doses of quinine, fresh water mixed with acid, a moderate wine diet, absolute repose. From the first administration of the antipyretic treatment apyrexia was obtained which was kept up for a few hours, a profuse perspiration following, with modification of the pain of the testicle; then continuing to administer the remedy, after two days the apyrexia was complete and steady, with gradual modification of the pain and sensible diminution of the orchitis. I then prescribed, with the preparations of quinine, iron, mountain air, nutritious and healthy food, etc. Mr. W. left Rome after about two weeks, feeling much better, as well with regard to his general as to his local condition; and his wife was perfectly cured. I have heard nothing more of them.

The case briefly related leaves no room for doubt as to the diagnosis of the malady, and therefore of the existence of the

orchitis malarica described by Dr. Charvot. Especial causes independent of the malarial cachexia were not discoverable in the case of which I have spoken. For this reason it may be considered that the orchitis had been recently produced by the deep infection. One may therefore conclude that orchitis malarica, unknown among us, belongs to some malarial districts of warm and tropical countries.

# REMARKS ON INFLUENZA.

By J. CHESTON MORRIS, M.D.

[Read June 4, 1890.]

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I wish to place a fact on record at this meeting of the College, and a hypothesis as to the nature of the epidemic influenza which we have all been treating during the past eight months.

The fact is this: In December last I was called to see Mrs. W., living on Thirteenth Street, below Lombard, and found her suffering from a severe attack of the "grippe." Her first remark to me was, "Doctor, I am attacked by the same cold you cured me of last August." On turning over my note-book I found that I had in *August* recorded her case as influenza.

Now, then, for my hypothesis as to the nature of this singular malady. We have had it recurring more or less irregularly, with greater or less severity, since 1842. Each epidemic has been marked by symptoms of its own—in one year the force of the disease would seem to expend itself on the throat; in another, on the mucous membranes of the eyes and nose; in another, on the bronchial surface. In all, as in the epidemic of this year in a more specially marked manner, there has been one feature in common of this Protean disease—that of debility, prostration of strength and vital energy. The first uncomplicated fatal case in this city, I believe (that of Mrs. C., on Thirty-eighth Street, above Market), was one of simple loss of power in heart and lungs. From what I have since seen, I believe that the death of Professor S. (Lombard Street, below Fifteenth), whom I saw in consultation at the close of what his attending physician called a low nervous fever, preceded by

repeated alarming attacks of heart-failure and pulmonary congestion, was due to the same cause. This view, that there is a loss of power of the heart and lungs to perform their work is, I believe, shared by the great majority of observers. But this epidemic has been characterized by three other sets of symptoms: First. Violent neuralgic pains in various parts of the body. Second. Intense mental and nervous depression, out of all proportion to any physical signs to be detected; people "never felt so ill in their lives"; strong and active men became nervous and apprehensive in a manner and to a degree to alarm all who knew them. Third. Many suffered (and of this form of the disease I have seen a number of cases lately) from a loaded condition of the sigmoid flexure and rectum, with constant straining efforts at stool, ineffectual except in the discharge of a little glairy mucus, and with sharp, cutting, colicky pains due to gaseous distention of the colon.

These symptoms—the failure in heart and lungs, the abdominal sufferings, and the neuralgic pains—all point to a neurotic cause, such as the paresis or partial paralysis of the pneumogastric nerve. And this I believe to be the true nature of our epidemic. I have fought it accordingly, since I recognized it as such, with stimulating doses of whiskey, opium, and strychnine, watching for recurrences and relapses, and treating them as they took place.

If we were to look for a cause of this paresis, affecting so many persons at once, scattered over so large a portion of the northern hemisphere, travelling more rapidly than by human modes of transportation, or following other than ordinary lines of communication, where should we be so likely to find it as in a state of the atmosphere which rendered the process of breathing more difficult and exhausting than it ordinarily is? Some slight change of barometric pressure, or of humidity, would give ample occasion for fatigue of the pneumogastric and other nerves controlling respiration and circulation, the effect would be felt in each system in its weakest spot, and we would have thus an explanation of the very various symptoms and phenomena presented.

# THE TREATMENT OF GOITRE BY GALVANO-PUNCTURE. REPORT OF CASES.

By JAMES HENDRIE LLOYD, M.D.,
PHYSICIAN TO THE HOME FOR CRIPPLED CHILDREN, PHILADELPHIA.

[Read October 1, 1890.]

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There have appeared in the medical journals several times in the past few years reports by different writers of the successful treatment of goitre, or bronchocele, by puncturing the growth with needles and passing a current of galvanism directly into the tumor-mass. Among the most successful cases reported were those of Campbell, Rouge, Gröh, Amory, and Duncan. The simplicity of the procedure, its strictly scientific character, and the very satisfactory results obtained by it have always made it appear strange to me that these cases have not attracted more attention, and this treatment been more frequently tested. I was first induced to make trial of it four years ago in behalf of a lady who was suffering some of the most serious inconveniences goitre can inflict, and who had been refused surgical aid by eminent members of the profession. The report of her case and several others will form the body of this paper.

The use of electricity in this manner is founded upon well-established physical laws. Electrolysis is the great elementary fact in electro-physics. As there is much discussion now about the value of electrolysis in some departments of surgery it may be as well to define at once the meaning of this term, especially as both those who use and those who condemn it appear often to ignore some essential facts. Electrolysis is the breaking up into its constituent elements by the galvanic

current of the substance through which it is passed. Thus, if a current is passed through water the oxygen passes off at the positive and the hydrogen at the negative pole. This is according to a definite law of quantity, *i. e.*, so much electricity, so much oxygen and hydrogen. What occurs in water occurs also in more complex fluids, such as milk, blood, serum, and fluids containing chemical substances in solution. The more complex and organized these fluids or substances are the more difficult it is to state in exact chemical terms what the changes are; but there can be no doubt that the process is just as strictly according to law in the structures of the human body as in the simplest of all fluids, water, and that the amount of change is in accurate accord with the quantity of electricity employed. It thus becomes evident that the dosage of electricity must be *sufficient*, and also that the current must be brought into *direct contact* with the substance or tissue to be acted upon. Hence it is not proper to pass it through skin or mucous membrane. A wet sponge electrode applied on the skin over a goitre is simply useless: and an electrode plunged into the depths of the vagina, where it must act through a moist mucous membrane, whatever else it may do, does not cause much electrolysis in a fibroid tumor. Finally, it is of practical importance to remember that the positive pole collects about it the acid constituents, and is, therefore, very irritating, apt to cause sloughs and hemorrhage, and erodes the needle unless this be of platinum, while the negative pole is free from all these objections. Hence the negative needle alone may be used, although both needles are doubtless more efficacious.

CASE I.—Mrs. ——, aged sixty years, had a goitre involving the whole gland, but somewhat larger on the right side. It was especially prominent in front, causing an ugly deformity. It was of several years' standing, and tending to get worse. It was rather doughy in its consistency, and apparently had not undergone cystic degeneration. There was no exophthalmos, but there was great disturbance of circulation, especially in the head. This caused a constant sense of fulness, with noises in the ears, which was her most distressing symptom. She had a sense of pulsation in the tumor, synchronous with the heart, and a heaving impulse of the heart, with occasional palpitation. Her health was suffering to such an extent that she said she

would be willing to take any risk to have the tumor cut out. She had been advised against excision by all her medical and surgical attendants. I undertook the case with misgivings, but determined that the remedy should be applied in a rational way and thoroughly tested. For this purpose I had constructed three small gold-plated needles well insulated to within one-third of an inch of the point. These were connected by a branching cord, so that all of them could be attached to the negative pole. Briefly, the method was as follows: The needles were inserted well into the tumor, far enough to protect the skin by the insulating material. Care was taken to avoid veins, several of which, very large, ran over the surface of the gland. The positive pole was connected with a large, flat sponge-electrode (four by six inches), which was applied to the nape of the neck. Thus resistance was reduced as much as possible, and a strong current made possible without too much pain. Even thus, however, the skin under the sponge became very angry at times, and in one instance blisters were formed. The strength of current employed varied according to the state of the gland and the patient's endurance. I always tried to keep it up as strong as could be borne, because the law of electrolysis teaches that returns are commensurate with outlay. No antiseptic agents were used, because the galvanic current in the strength employed is probably antiseptic. The needles were kept scrupulously clean. The greatest strength reached was 24 milliampères, but this could not be long endured, as it caused much pain, giddiness, and salivation. The average was probably somewhere from 14 to 18 milliampères. An accurate milliampèremeter was kept in circuit, and constantly observed; and a water rheostat was used to avoid shocks. This last is an important precaution when using strong currents about the head. The length of each sitting was about twenty minutes. The time factor is important in electrical measurements, for of course, the longer the agent acts the greater the effect.

The results of the individual application were these: The gland-tissue became swollen around each needle, sensitive to pressure, and gas (probably hydrogen) crepitated within it and escaped from the punctures. The skin was sometimes reddened for some distance even beyond the gland, and occasionally the points of puncture were distinctly burned, because of defective insulation. For a day or two after the sitting the gland would be very sore, and on several occasions looked as though it would suppurate. This it never did, however, in this or any other case—a point to which I wish to draw especial attention. It was sometimes mottled and ecchymosed. The number of applications was fourteen, given at intervals over a period of six months.

The final result has been all that could be desired. The patient is cured. She has but a small portion of the obnoxious gland-tissue left—and all who know the risks of myxœdema will agree that it is better she should have some left. Her other symptoms have entirely disappeared. She has no throbbing in gland or head, no sense of fulness in head, no palpitation.

By actual measurement the gland has been reduced several inches, and is now so small that it does not project sufficiently from the surface to make any difference in measuring the circumference of the neck. There are a very few punctate scars. It is very important to state that permanent results did not appear until long after treatment was commenced, and that subsidence of the gland having once commenced continued for a long time after treatment was permanently stopped. This has been observed by others, and is important in its bearing on the progress of the case. It is now more than three and a half years since this patient's final treatment. She has had no return of her tumor or its symptoms.

Case II.—This was a young lady with a small goitre of about eighteen months' standing. There was no exophthalmos or any physical symptoms of importance. She had, however, much mental disquiet on account of the tumor, a state of mind which I have noticed in most young women who have goitre. The same treatment was adopted as in the first case, except that only one needle was used as the growth was small. The strength of current was kept up as high as could be well borne, which I found was from fourteen to twenty milliampères. I gave her treatment every week for a long while, but I think now that if a strong current be used it will probably be found unnecessary to repeat at such short intervals or so many times. This patient after one treatment had quite a severe inflammation involving the gland and extending in the skin some distance down on the chest. She suffered some inconvenience also during treatment from violent twitching of the sterno-cleido muscle, although the current was not interrupted. Some punctate scars were made because the insulating material was brittle and broke off. This was the cause also of the inflammation of the skin. When treatment was stopped the gland was shrunken up and was hard and gristly. More than three years have passed, the patient has married and become a mother, and I have not heard of the tumor's return.

Case III.—The result was not satisfactory in this case, because, in part at least, the goitre was not a satisfactory one for the trial. It was an immense growth of many years' standing, in a woman about forty years old, It bulged out on both sides, reaching almost under the ears, and had very large veins running through and over it. I think part of it was occupied by a large cyst. The same treatment by puncture, and by strong currents, was employed, but the patient soon discontinued her visits and I heard nothing more of her.

It was a very unfavorable case for any kind of treatment, and the only comment possible is that it had been allowed to grow too great before being submitted to the current.

Case IV.—This was a very favorable case of follicular goitre in a woman but after the first application the patient declined to submit again, as she feared the pain and the faint sensation caused by it.

I think in such a case ether could be used with advantage, the current strength being carefully gauged by a galvanometer. I have at present under observation two other cases, both in women. One is a cystic goitre which has already been operated on by another physician, by injections. It has been only partially obliterated by the injections, and is much disfigured by hard and extensive scar tissue, so that I do not look upon it as a very favorable case for electrolysis. The sixth case is a soft follicular goitre of the right lobe of the gland, in a young woman, and is the kind of a case which ought to be benefited.

*General Conclusions.*—None of these cases have been examples of exophthalmic goitre, although the first had some cardiac and vaso-motor symptoms. They have been cases of follicular bronchocele, *i. e.*, enlargement of follicles, some of them ultimately forming cysts. I think the treatment is especially applicable to goitre in this early stage, although the first and most successful case was a long-standing goitre in a woman sixty years old. It would be an especial boon in the exophthalmic form of goitre—in fact it has been used with success in this by some of the observers named above. I am not aware that thyroidectomy has been practised in exophthalmic goitre. In thyroidectomy there are two especial dangers—tetany and myxœdema. I saw no symptoms of the former in any of these cases—but of course the number is very small. In the first two cases nearly four years have passed and there have been no symptoms of myxœdema—nor has it been observed by others in their cases. As the gland is not completely destroyed it would seem that the risk of this mishap is reduced to a minimum.

Finally, there should be no scars in these cases if the needles are properly insulated. There is no hemorrhage, and in the above cases, with very strong currents, there was no suppuration. As Fort[1] has very aptly expressed it, electrolysis is the formation by chemical action of a bloodless incision without elevation of temperature.

[1] Gaz. d. Hôp., Paris, 1889, lxii. 768.

I have thought it best to put these cases on record, not that I am an advocate of the method as against any and all other surgical procedures, but because in these cases definite beneficial results have been obtained in a precise manner—and this is all that the art of surgery or therapeutics by any method aims to achieve.

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## DISCUSSION.

Dr. Charles K. Mills: For a number of years I have at intervals treated cases of goitre; more particularly exophthalmic goitre, as this disease is more likely to come under my observation. I have also treated a few cases of the form of goitre to which Dr. Lloyd has referred this evening. My experience with electricity in the form of goitre referred to by Dr. Lloyd is that no effects that are permanent are obtained from the use of the electric current by the method without puncture. I have treated cases ineffectually for weeks and even months with the electric current applied to the surface. In exophthalmic goitre, I have had several cases where the use of electricity without puncture, conjoined with internal remedies, was followed by benefit. I have notes of some cases in which the method, as Dr. Lloyd has described it to-night, was pursued. One case was that of a woman sixty years of age, who had had a goitre for a number of years which seemed to be growing steadily. It was hard and nodulated, and had grown to such a size as to cause distressing symptoms. She had many of the symptoms already referred to as occurring in the first case described in the paper—such as a distressing sensation in the head, with tinnitus at times; she also suffered much from dyspnœa. I determined to try the method carefully for as many weeks as the patient would submit to it; and used an electrode consisting of three gold-plated needles insulated in the manner described by Dr. Lloyd. These were introduced into the tumor and a large sponge electrode was applied to the back of the neck and the back. This treatment was used three times a week for about two weeks, without apparent benefit. In the third week improvement in the symptoms began, and the tumor diminished somewhat in size. The treatment was continued five weeks with great benefit to the symptoms and some reduction in the size of the tumor, perhaps a reduction of about one-fourth its entire bulk. The patient then returned to her home in the country with all of the distressing symptoms relieved. I have seen her once or twice since then, the last time a few months ago, and the improvement continues. This is really the only case in which I have pursued the method with great care. It is well worth while to speak of the cutaneous applications, because many electricians persist in applying the electrodes to the surface of the skin and passing as strong a current as the patient will bear, but generally the results of this method on the whole are not decided. Perhaps in cases of

exophthalmic goitre, as reported by Dr. Rockwell, of New York, and by others, who have used the superficial method, the good results have been due in part to electricity and in part to time and other measures. I am thoroughly convinced of the great benefit to be derived from exact methods of using electricity by needle, puncture, etc., carefully regulating dosage with appropriate instruments.

Dr. John B. Deaver: I do not feel that I can add anything to what has been said, as I have had no experience with the electrical treatment. I have seen one of the cases which Dr. Lloyd has reported, and there is no question that the cure is perfect and there is scarcely any evidence of the punctures.

I should like in this connection to show a specimen of unilateral, fibrocystic goitre which I removed last week. This was from a male subject, and was of twelve years' standing. It had not been subjected to any radical treatment, though the patient had taken iodine and applied various ointments. I removed this mass without any difficulty. The wound healed in three days and there have been no bad symptoms. This is the second unilateral goitre that I have removed in this manner. The first case was perfectly satisfactory in its results. The tumor involved the right lateral lobe. The pedicle formed by the isthmus was ligated with antiseptic silk, the ends of which were cut off and allowed to remain. I tied the superior and inferior thyroid arteries before interfering with the pedicle. The only inconvenience was some trouble in swallowing during the first twenty-four hours after the operation. This was probably due to some interference with the œsophagus in the separation of the tumor.

Dr. Lloyd: I wish only to call attention to the fact that this method by puncture and the employment of strong currents has been especially useful in cases of exophthalmic goitre. Several of the cases reported by Armen, Duncan, and others have been of exophthalmic goitre. These cases are peculiarly unamenable to ordinary forms of treatment. I am not sufficiently familiar with the work of German surgeons in connection with thyroidectomy to know whether or not they perform the operation in exophthalmic goitre. I think, however, that it is doubtful. I do say that these cases are benefited if the current is applied according to definite chemical and electrical laws. Electricity suffers so much from the absurd claims made for it by some who are more enthusiastic than always accurate, that I hesitate a little to become its advocate in a public medical society; but I think that it is to be understood that, if we use it in a definite and accurate way, we shall get definite results.

One serious matter in the excision of bronchocele is the possibility that the peculiar myxœdematous condition may follow. I believe that the results of some of the German surgeons have given as many as six or eight per cent. of myxœdematous cases. We do not know whether our patient is going to be one of that six or eight. For myself, I think that I would rather have the goitre than take the chances of becoming a myxœdematous imbecile.

# THE CORROSION METHOD IN THE STUDY OF THE ANATOMY OF THE EAR.

By B. ALEXANDER RANDALL, M.D.,
PROFESSOR OF DISEASES OF THE EAR IN THE PHILADELPHIA POLYCLINIC, ETC.

[Read November 5, 1890.]

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THE method of filling the cavities of an organ with a congealing mass and then corroding away its tissues to leave free the cast thus formed, has been long and profitably employed by anatomists; and most beautiful and instructive preparations have been thus gained. Various drawbacks and difficulties have limited its application, however, and the number of fine results by the older methods which may now be found in the museums is not great. Following the lead of Lieberkuhn, Meckel, and others, Hyrtl made especial use of the method, and a fine series of his casts in wax is preserved in the Mütter Museum. He modified the injection-mass so as to free it from much of the crumbling fragility which had brought to nought most of the finest work of his predecessors, and gave the casts a protective coating which has greatly increased their durability. Yet only by scrupulous care and preservation under glass can such preparations be kept intact; they must be perfectly supported, lest even at ordinary temperatures they should become distorted by bending of the material of which they are composed. Their delicacy is not as great as may be obtained in metal, and the protective coating somewhat obscures and falsifies the finer details.

The ear, with its elaborate intricacy, is one of the organs in which the method can be most advantageously employed; and

while much was done in its study in this manner by Hyrtl, who used the procedure for comparative as well as human anatomy, as the specimens in the Mütter Museum show, it was by Bezold, of Munich, whose valuable brochure was published in 1882, that the subject received its fullest elaboration. Yet the method with wax masses was but a step toward the attainment of the best results; and the return to the use of fusible metal and the improvement of the *technique* have furnished casts far more delicate, yet durable, than were before obtainable. A number of excellent casts made in metal by Dr. Goddard, in 1831, and by Horner a little later, are preserved in the museum of the University of Pennsylvania, so the credit of first successfully employing metal belongs, perhaps, on this side of the Atlantic. Yet much credit for the recent advances is due to Siebenmann, of Basle, who presented exquisite examples of his work at the International Otological Congress at its meeting in Brussels in 1888, and has since published an elaborate monograph upon the revelations thus made in the internal ear.

The writer was much impressed with the beauty of Siebenmann's specimens, which he then studied with the greatest interest, and at once made preparations to follow his example; but press of other work and lack of adequate material have long delayed the undertaking, and the preparations now presented form only a beginning of the series planned. It is hoped, however, that they will serve to bring the method into deserved notice, and that others will find how invaluable an aid it can be to them, and will widen its applications to many other fields. Surely in America, where perhaps fusible metal was first thus employed with success, it ought to yield results second to none elsewhere obtained.

It is hardly necessary to point out that in this instance, contrary to what obtains in vascular injection-preparations, the results gained are negatives, which represent the cavities, not the structures, of the organs, and need for their full comprehension to be supplemented by preparations of the structures themselves. The important point is that they furnish tangible

expressions of the details that are otherwise hardest to grasp; and as illustrating the value of such negatives, I can refer to the magnificent series of preparations by a similar, but far more difficult and tedious, method with which Dr. Piersol captivated the Anatomical Congress in Würzburg some three years ago. The specimens presented will also, it is hoped, speak for themselves; and while revealing many defects, as well as wide gaps in the series necessary for an adequate demonstration of the subject, will also show points that are somewhat new.

The essentials of the method are well known, but its minute details are noteworthy, since upon these refinements depend the perfection of the modern results. The preliminaries vary with the organ to be moulded. If a macerated bone, such as the temporal, it is thoroughly dried and cleaned, and inclosed in linen so pasted on as to bridge the sulcus of the lateral sinus and other grooves and to close all openings except the distal end of the carotid canal, into which a long paper funnel is glued. The whole is then embedded in a large block of plaster-of-Paris, is thoroughly dried for several days, and then warmed to about 200° F. Wood's metal—a fusible alloy melting at about 150° F.—is melted upon a water-bath and poured into the funnel in a full stream until the level ceases to sink. Quick cooling in water is followed by the removal of the plaster and linen envelopes, and the preparation is placed in a warm ten-per-cent. solution of caustic potash. Disintegration of the bone rapidly proceeds, and will be largely accomplished in about two weeks. The older method of picking away the remaining calcareous masses is too dangerous for the delicate portions of the cast, and is to be wholly avoided. The preparation, after washing, is to be placed in a cold ten-per-cent. solution of muriatic acid, which dissolves away the lime particles without injury to the metal beyond an occasional tarnishing, and even this may be avoided by coldness of the solution and the exclusion of daylight. Return to the alkaline solution may be needed to complete the corrosion; the most rapid results being gained by frequent alternation.

The specimen is finally given a prolonged washing in running water, superfluous metal is sawed or filed away, and the cast is mounted for preservation. While the material is fairly strong and possessed of some flexibility and elasticity, careful handling is essential to the preservation of the extremely fine details which it is capable of reproducing, and my specimens already show numerous fractures as the result of rough treatment.

In preparations of the soft parts, injection with the syringe may be sometimes needed, since it is not easy to warm the organ sufficiently to facilitate free flow of the metal without undue drying or maceration; and the closure of the few openings may be readily accomplished without the elaborate embedding. Putty or modelling clay, or even a cold, damp cloth will generally suffice to prevent the escape of the metal when it appears; and until it has thoroughly penetrated, the openings should remain free as exits for the air or fluid filling the cavities. For the lungs, or other closed organs, the whole preparation may be immersed in boiling water, and by prolonged action the air displaced by the metal, even in the alveoli.

Some remarks as to the specimens presented seem in place. They have been obtained both from the recent cadaver and from the macerated temporal bone. As to the former, my only material has been the head of a child, left forgotten for six months in Müller's fluid, and apparently in very bad condition when freed from the thick layer of mould which covered it. Casts were made by pouring the metal into both external auditory canals; but, as they seemed to have failed, an effort was made to withdraw them and repeat the procedure. By the exercise of all the traction which I was able to exert through a strong loop of cords, the cast was extracted from the left canal; but on the right, although quite movable as it lay *in situ*, the cast could not be dragged out, and broke short off at the isthmus. The left drum-head was found to have been well moulded (Fig. 2), and through a perforation in its upper posterior portion the metal had penetrated into the tympanum,

but broken off on extraction. A subsequent cast of the same canal (Fig. 3) shows that grave violence had been done to the soft tissues, and gives additional evidence as to the difficulties and dangers of extraction efforts for the removal of impacted foreign bodies. A cast was also made of the upper air-passages by pouring the metal into the trachea of the inverted head. It did not pass to the nasal orifices; but the attempt to supplement the result by pouring from in front showed, as does the cast upon removal, that the penetration was really very good. It was seen on investigation that the metal had hardly entered the orifices of the Eustachian tubes; so, as these casts were especially desired, the attempt was made to preserve the specimen for renewed endeavor to obtain injections of the tubes. The head was sawn asunder, and the specimen removed without corrosion—a decided mistake, as several fractures bear witness, hardly excusable even in my dearth of material. The resulting preparations are very imperfect, yet reveal some very interesting points. The metal was later poured into the frontal sinuses and the antra of Highmore—none having previously gained entrance through the very narrow infundibulum.

The cast of the upper air-passages (Fig. 1) is, probably, the most interesting and practically valuable in its teachings. It will be seen by its examination that not only are the Eustachian tubes direct extensions of the naso-pharynx, linking the tympana into direct continuity with it; but that, on the other hand, the mouth is not legitimately an air-passage at all. Poured freely into the trachea, the metal had almost no tendency to enter the oral cavity, although there was not the slightest artificial obstruction to its passage. The epiglottis deflected the flow back against the posterior wall, and, with the uvula, formed a nearly complete anterior wall to the pharynx. Only enough metal found its way forward to define the location and size of the uvula and the lower margin of the soft palate. The glottis, with the laryngeal ventricles faintly marked above it; the pharynx, with its granular back wall and its anterior limitation by the meeting of epiglottis

and uvula; the posterior nares, with the fossæ of Rosenmüller, the large pharyngeal tonsil, and the slit-like Eustachian tube mouths; the nares, with good impressions of the three turbinal bodies—these, and many points of minor importance, are fairly well shown. The specimen gives promise of far more beautiful and probably instructive results under more favorable circumstances; and it shall be my earnest endeavor to obtain a cast showing in one continuous mass all of this, together with the tubes, tympana, mastoid cells, and the accessory sinuses of the nose—a complete and tangible demonstration of the essential relation of aural and nasal disease.

The remainder of my preparations are casts of the macerated temporal bone in infant and adult life, none of them quite perfect, yet each showing some point of beauty or anatomical importance. The extreme variations in the extent to which the mastoid is occupied by pneumatic cells is well illustrated —one of the finest casts (Fig. 4) showing only a few such cells continuous with the tympanum, while its remainder is of diploic structure; another (Fig. 5), a mass so dense and full as naturally to raise a question as to where there was any room for bony walls and septa. Still another (Fig. 6) answers, in great part, the objection which might be urged against this method of study as contrasted with that by sections, in cases where pathological process is present. A single chain of pneumatic cells reaches down to the tip of the process, while the rest of the mastoid is vacant, except for some still undissolved calcareous masses. This is from a case of inflammatory sclerosis of the bone, where the entire mastoid was converted into a solid eburnated mass, which the corrosion showed to consist of hypertrophied septa inclosing still more compact and almost structureless nodules. Much can be learned as to the structure and density of the bone by thus watching the progress of the corrosion; and under proper precautions it is probable that the method can furnish evidence, distinct though negative, where sections would leave the question of the mastoid condition still in doubt.

Of the casts of the bony labyrinth it is hardly necessary to

speak; for, while they probably surpass any which I have seen, they fall decidedly short of the exquisite delicacy which is revealed by some of the recent results figured by Siebenmann. They are offered simply as the first attempts of a beginner, and their shortcomings are due rather to blunders and defective material than to the method which they but imperfectly illustrate. It is significant to note that such experts as Bezold speak of frequent failures by the wax-mass injection, while their highest successes hardly attain the beauty, and fall far short of the durability, of those here presented.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

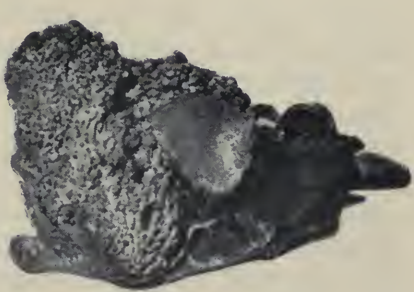


Fig. 5.

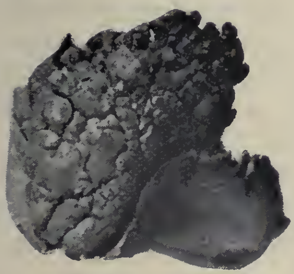
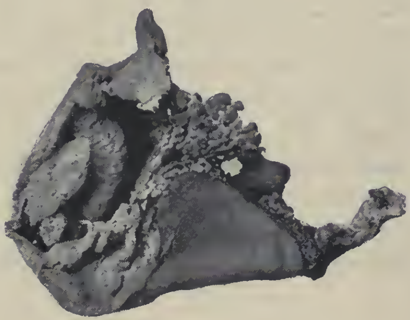


Fig. 6.



# SOME EXPERIMENTS TO DETERMINE THE LESION IN QUININE-BLINDNESS.

## A Preliminary Note.

By G. E. de SCHWEINITZ, M.D.,
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[Read November 5, 1890.]

The characteristic clinical features of the cases of quinine amaurosis, summarized by Knapp (*Archives of Ophthalmology*, vol. x. p. 220) as total blindness subsequent to taking large quantities of quinine, pallor of the optic disks, marked diminution of the retinal bloodvessels in number and calibre, and contraction of the visual fields, have been especially elaborated by American ophthalmic surgeons from the time when Roosa's report appeared up to the date of the analysis by Atkinson (*Journal of the American Medical Association*, September 28, 1889). These features are so definite that blindness from the abuse of quinine is an established fact, and it now remains to be shown exactly what the lesion is, and what its position, which causes the loss of vision. Buller (*Transactions of the American Ophthalmological Association*, 1881, p. 262) believes the locus of the morbid process is to be found in one of three situations: (1) within the cranial cavity; (2) within the eye; and (3) in the course of the optic nerve between the chiasm and the eyeball. He rejects the first two of these positions, and thinks that the latter affords the best explanation, by assuming a rapid effusion into the lymph-spaces around the nerves, too transient to cause papillitis, but suffi-

cient to induce œdema and blanching of the retinæ and impediment in the blood-carrying capacity of the central arteries. Edgar A. Browne (*Transactions of the Ophthalmological Society of the United Kingdom*, vol. vii. p. 193) points out the resemblance of the subjective symptoms to embolism of the central artery of the retina, but shows that such a theory is untenable. He further indicates the probable local nature of the retinal anæmia, the influence of the vasomotor system, and the absence of perineuritis,[1] and suggests the possible influence of highly cinchonized blood upon a peripheral circulation, causing sufficient contraction to prevent the ingress of blood. It is obvious, as Buller has said, that uncomplicated cases of quinine-blindness are rarely encountered in human beings, because this drug is not administered to them in sufficient dose to produce amaurosis, unless some disease calling for its exhibition is present. Thus, in Browne's collection of thirteen cases, the following diseases were present: intermittent fever, pernicious fever, septicæmia, pneumonia, neuralgia, malaria, and drunkenness. Exceptions to this are the instances when the alkaloid has been taken by mistake, one of which is given by Browne, and the case of a man described by Giacomani, who took three drachms of quinine, instead of cream of tartar, to relieve constipation. This example, as Dr. Gruening has pointed out, presents the value of a physiological experiment. As the opportunity for examining such cases has been rarely presented, the best method of studying this problem is to induce quinine-blindness in animals, observe the early ophthalmoscopic appearances, and microscopically to study the optic nerves, chiasm, and cortical centres of vision. With this end in view, the following experiments were undertaken. In all dogs were used whose general condition was healthy, and whose fundus oculi was shown by ophthalmoscopic examination to be normal. The quinine was administered hypodermically in solutions made from the bimuriate of quinine combined with

[1] Dickinson's case of tumefaction of the optic nerve, resembling "choked disk," was probably caused by some factor (possibly malaria) other than quinine.

carbamide of urea, or in the form of the bisulphate dissolved with the aid of tartaric acid:

EXPERIMENT 1.—*March* 13, 4 P. M. Dog A, weight 16 pounds. Sixty grains of quinine injected beneath the skin. An hour later the dog vomited several times, and dragged its hind legs. Twelve hours later the dog was blind.

14*th*, 4 P. M. Dog entirely blind; pupils widely dilated and irresponsive to light; the disk pallid and retinal vessels contracted.

15*th*, 12 M. The same state of affairs.

16*th*. Blindness continues. There is slight clouding or mellowing of edges of disks.

19*th*. Dog entirely blind. Optic nerves whitish, edges clear, vessels much contracted.

29*th*. Sufficient recovery of sight only to keep him from walking into large objects; perhaps familiarity with room explains this. Optic nerves pale, vessels small.

*April* 11. No further recovery of sight. Killed, and eyes, chiasm, optic tracts, and occipital lobes of brain removed and placed in Müller's fluid.

EXPERIMENT 2.—*March* 17, 4 P. M. Dog B, weight 15 pounds. Hypodermic injection of one drachm of quinine. Previous examination showed normal pupils and fundus oculi.

18*th*. No general symptoms except great weakness when put into kennel between 6 and 7 P. M., apparently "not seeing anything well" (statement of attendant).

18*th*. Dog found dead at 6 A. M. Eyes, optic chiasm, occipital lobes removed and put in Müller's fluid.

EXPERIMENT 3.—*March* 19, 4 P. M. Dog C, weight 10 pounds. Thirty grains of quinine given hypodermically. In ten minutes the hind legs were dragged, the dog was partially paraplegic and staggered in his gait. At 4.30 P. M. the animal vomited and purged several times. At 5 P. M. he was weak, dazed, and apparently partially blind and deaf.

20*th*. Entirely blind at 6 A. M. At 3 P. M. clonic spasms followed by paralysis of the hind legs. The retinal veins not much changed in size; the arteries mere threads.

21*st*. Completely blind and paralyzed. Killed, and the usual organs removed and placed in Müller's fluid.

EXPERIMENT 4—*March* 22. Dog D, weight 25 pounds. Twenty-five grains of quinine given at 4 P. M. Normal fundus oculi.

24*th*. Dog completely blind; the arteries of the retina small, the disk pale, and in the right eye *the upper vein just before it left the disk showed a constriction very much as if a thrombus had formed.* No similar change in other eye and no hemorrhages. The dog's eyes were prominent (slight exophthalmus), and the pupils widely dilated and irresponsive.

*25th.* Dog completely blind. In right eye *the circle of veins on the disk completely obliterated,* the arteries faint threads. No similar change in left eye. The dog was killed, and the usual organs removed and placed in Müller's fluid.[1]

Experiment 5.—*March* 24, 4 P. M. Dog E, weight 23 pounds. Thirty-two grains of salicylate of sodium were given hypodermically.

*25th*, 4 P. M. No results in any way from the salicylate of sodium. The same dog was given twenty-five grains of quinine.

*26th.* No effect from the quinine. This is the first dog unaffected by a similar dose. Thirty additional grains were injected.

*27th.* Dog completely blind. Paresis of hind legs.

*29th.* Some return of vision. Optic disks pale, and arteries small.

*31st.* The apparent slight return of sight remains; fundus oculi as before. The animal was killed at 5 P. M., and the usual organs placed in Müller's fluid.

Experiment 6.—*April* 1, 4 P. M. Dog F, weight 16 pounds. Thirty grains of quinine injected.

*3d.* No effect in vision or general condition. Thirty additional grains injected April 9th. Although this dog has received sixty grains there is no effect of the quinine on the vision. Thirty more grains injected.

*10th.* Shortly after the injection of April 9th, tremblings and paralysis of the hind legs appeared. To-day, at 10 A. M., clonic convulsions began, and, shortly afterward, the animal died. It was difficult to decide the amount of the blindness, owing to the convulsions; this seemed complete. The eyes were removed and placed in Müller's fluid.

Experiment 7.—*April* 5, 4 P. M. Dog G, weight 20 pounds. One drachm of quinine was injected. The next day the laboratory was closed, and on the 7th the animal was found dead. The effect of the drug upon the vision was not ascertained, and the usual organs were not removed.

Experiment 8.—*April* 15, 4 P. M. A normal dog was killed, and the usual organs removed for microscopical examination and comparison with the portions taken from the "quinine dogs."

From this record it becomes evident that when quinine is given hypodermically to dogs in quantities varying from one grain to the pound to four grains to the pound, blindness, generally accompanied by the other disturbance, is apparent in from three to fourteen hours. The exact date of the onset of the loss of vision was not determined; the earliest date of

[1] This experiment is interesting in connection with the observation made by Voorhies in his case, where, one week after the poisoning, the disk was perfectly white and there was not a trace of optic-nerve vessels.

its appearance after injection which was noted is three hours. The blindness remained practically complete in one animal for twenty-nine days after a single injection of $3\frac{3}{4}$ grains to the pound; in one there was slight return of vision after thirty-six hours of blindness. The effects of the drug were more surely and quickly obtained with quin. bimur. carbamidat. than when the bisulphate was used. A dose exceeding $3\frac{3}{4}$ grains to the pound produced death (Experiment 2); one animal (Experiment 7) perished from a dose of 3 grains to the pound; and one dog (Experiment 6) resisted $1\frac{7}{8}$ grains of quinine to the pound given on two successive days, but succumbed when a third similarly proportioned dose was administered. In a single experiment (Experiment 5) salicylate of soda, in the proportion of $1\frac{1}{2}$ grains to the pound, produced no results on vision.

In these animals the ophthalmoscopic picture was similar to that seen among human beings with quinine amaurosis, and in one there was complete obliteration of the vessels on the optic disk, and in another blurring of the edges of the optic disks. In all, the pupils were immovably dilated.

The specimens which were removed for microscopical examination were prepared by hardening in Müller's fluid, and sectioned by the paraffine method. The stains were borax carmine and indigo carmine, and degenerations were sought for by the aid of Weigert's method. All of the preparation of the sections was carefully done by Dr. William M. Gray, in the laboratory of the Army Medical Museum.

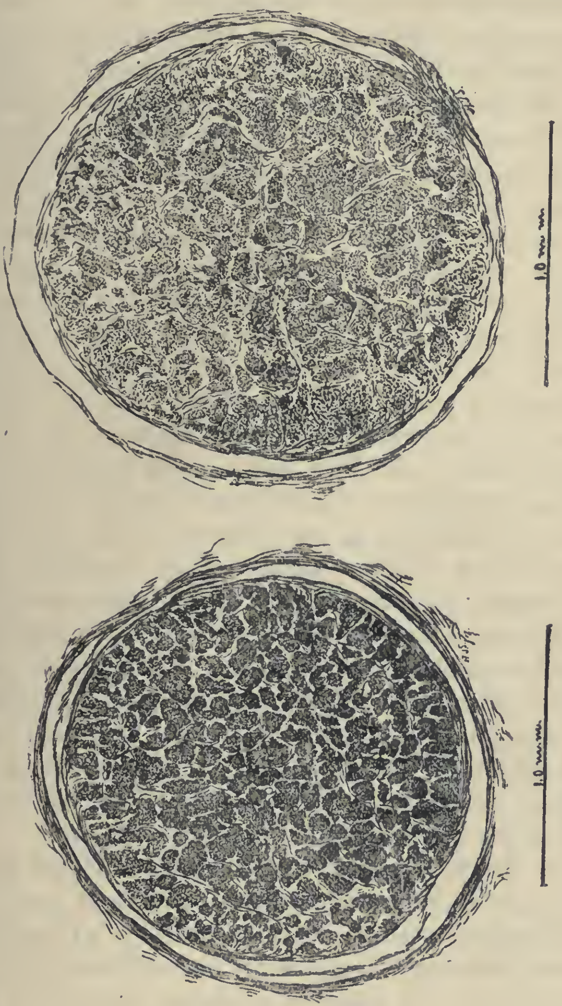
In brief, it may be stated that no very gross lesions, with one exception, were present in either the cross-sections of the nerves or in the optic-nerve entrance, or the retina. The exceptions were those sections taken from the right eye of dog D, Experiment 4. Here there was decided dilatation of the bloodvessels, and the central vein was plugged with a clot containing many fibrin prolongations, while in the transverse cuts of the vein white thrombi are seen (Fig. 1). Thus, microscopically it was demonstrated what previously had been noticed with the ophthalmoscope, namely, the appearances as

FIG. 1.


Optic-nerve entrance, showing clot in central vein. with its fibrin prolongations and white thrombi in smaller veins.

if a thrombus had formed. In the other nerve-entrances there was some dilatation of the bloodvessels, but to a very much

Fig. 2.




*A*, cross-section of normal optic nerve.

*B*, cross-section of optic nerve from a dog *a*, showing spreading apart of the individual fibrils.

smaller degree. The transverse cuts of the nerves did not exhibit any marked lesion. In a few there seemed to be some

slight increase of the connective tissue; in others, the nerve-bundles between the trabeculæ of connective tissue were wider than those of the normal animal; or, in other words, the trabeculæ themselves were less marked and the individual fibrils more spread apart, as if the tissue was œdematous and swollen out (Fig. 2). There were no discovered lesions in the retinas. Weigert's stain failed to show any such degeneration as might have been present from an atrophy; neither was there any appearance indicating neuritis. The optic chiasms were normal in every respect.

In the sections taken from the cuneus, in all instances the same lesion was present, namely, a remarkable dilatation of the pericellular lymph-spaces, with degeneration of the protoplasm of the cells. This lesion was probably most marked in the dog that had been longest blind. In presenting this fact, I do so perfectly aware that imperfections in the hardening process might be responsible for equal appearances. I simply state this as a fact, and am unprepared to support it in any way as rendering definite knowledge of the lesion in quinine-blindness. I am exactly in the position of him who has found associated with a certain disease a microörganism, but who has been unable to prove more than this association. Very many more experiments and very many more careful comparative microscopical studies must be made to show positively that any of the various lesions which I have described exist constantly in quinine-blindness, and these few have been recorded as results so far obtained in a research which is only in its infancy. Numerous experiments are now under way the results of which will be detailed in a future paper.

So far as the microscope is concerned, it may be said that, with the single exception of the blood-clot found in the central vein, no absolutely positive microscopic lesion was made out—that is, none that might not possibly be attributed to imperfections in *technique*. As negative evidence, however, it may be stated that even in dogs blind for nearly a month there is no atrophy of the nerve-fibres in the sense in which we ordinarily use that word; neither is there any appearance in the

earliest stage of the blindness of neuritis. It is not improbable that the conjectures of those who have placed the lesion between the optic nerve and the chiasm and eyeball have come near the truth, and that there is really a species of œdema. At the same time the influence of quinine upon the peripheral circulation must not be forgotten; and the fact, as I have shown microscopically, that under its influence a clot may form in the central vessel. Probably this is an extreme case, and should such an example arise in a human being, recovery from the blindness would not be obtained.

# A CASE OF NEURO-PARALYTIC KERATITIS, WITH MICROSCOPICAL EXAMINATION OF THE DISEASED EYE.

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[Read November 5, 1890.]

Since the days when Herbert Mayo showed that section of the trigeminus within the cranium produced insensibility of the eye, and Magendie, in 1824, demonstrated that division of this nerve in rabbits resulted in anæsthesia of the globe with inflammation and sloughing of the cornea, physiologists, ophthalmologists, and neurologists have undertaken a large amount of experimental research in the endeavor to prove definitely the cause of the corneal lesion. Even at the present day experimenters and clinicians are not in accord, and an examination of the statements in regard to the etiology of neuro-paralytic keratitis found in the standard text-books leaves the reader in doubt whether to accept that theory which ascribes the disease to a trophic change, or that which attributes it to the lessened power of resistance which the cornea, in its insensitive condition, presents to external injuries; or to believe with Gowers (*Diseases of the Brain*, p. 90), that "this neuro-paralytic ophthalmia, as it has been termed, probably depends on the irritation of the nerve by the lesion rather than on the anæsthesia or on the mere loss of nerve influence."

The case which I am about to detail presents certain interesting features both in regard to the probable situation of the lesion and the results of the microscopic examination :

William S., a German, aged fifty-eight, was free from disease until the year 1863 (perhaps 1866), when he was attacked, according to his own statement, with a bubo of the right side. He denied having had a chancre, but shortly after the appearance of the bubo his hair fell out. He continued to be in good health until three years later, when he contracted rheumatism, and at the same time iritis, which was double. These conditions were cured, and we have no further record of disease until March, 1884, when he suffered from left hemiplegia, the arm and leg being involved in the paralysis, with a cure in twelve weeks. In 1885 he had a second apoplectiform seizure, unaccompanied by palsy and followed by a rapid restoration to health. In January, 1888, he had left facial palsy, at which time the eye was said to be inflamed, but there is no definite record as to the character of the inflammation, which was evidently not that which subsequently destroyed his sight. In midsummer of the same year he left the hospital without any evident inflammation of either eye, according to the statement of the trained nurses in attendance. In January of the following year I made the following note: *Right eye:* Round pupil; light-reflex preserved; large, oval, optic disk with dish-like shallow excavation; disk distinctly gray, and arteries as compared with veins smaller than normal; spots of pigment on the anterior capsule of the lens, indicating the presence of a former iritis. *Left eye:* Pupil nearly occluded as the result of a former iritis, and preventing any view of the fundus; no evidence of disease of the cornea.

About this time various examinations made by Drs. J. Hendrie Lloyd and Charles K. Mills developed the following facts in regard to this patient's general condition: The left forehead was absolutely smooth, the left angle of the mouth drawn upward, probably due to a spastic condition. There was twitching of the eyelids and muscles of the left side of the face, inability to protrude the tongue, whistle, or dilate the left nostril. The left platysma was weakened, and the masseter and temporal muscles atrophied. The lower jaw could not be protruded to perform grinding movements, sensation was practically lost over the left side of the face, and degeneration reaction present in the muscles supplied by the seventh and fifth nerves. The left arm was paralyzed, with marked atrophy in the extensor and supinator muscles, together with advanced degeneration reaction and wrist-drop upon this side. The muscles of the left thigh and leg were impaired in power, the extensors and abductors having suffered more than their antagonists, but no atrophy was present, and there was ready response to both faradism and galvanism. Experiments with the tuning-fork seemed to prove the partial deafness which was present to be due to paralysis of the tensor tympani rather than to disease of the auditory nerve. In March the type of keratitis which caused the destruction of his eye began to develop, and speedily the following conditions obtained in spite of all treatment: Coarse episcleral injection, perforation of the lower half of the cornea with hernia of the iris and a filling of the

remains of the anterior chamber with blood, absolute anæsthesia of the cornea and conjunctiva, and lessened intraocular tension.

To sum up, it will be seen that this patient suffered from an atrophic paralysis, with degeneration in the left forearm; a paralysis not complete and not atrophic in the entire left leg; paralysis of the facial nerve and of the motor branches of the fifth nerve, involving some of the sensory fibres, producing anæsthesia of the left side of the face and of the left eyeball.

Dr. Mills, after an exhaustive study of this case, which has been reported in the *Times and Register* of December 7, 1889, and from which the facts in regard to the examinations other than those of the eye have been quoted, came to the conclusion that this man suffered from a lesion in the anterior horn of the left side in the seventh cervical segment, and that it reached out to the adjoining segments and also to the white matter of the crossed pyramidal tracts. The condition of the facial muscles was probably explainable by the presence of a lesion of the same character as that in the cord, destroying the cell groups of both the facial and trigeminal nerves. The left eye, which caused the man great inconvenience and some pain, and the cornea of which had sloughed, was removed, placed in Müller's fluid, and submitted to microscopic examination. The following lesions were found:

Below the centre there is complete perforation of the cornea, the aperture being occupied by the stump of the prolapsed iris, which is granulating and crowded with numerous inflammatory and large, granular, pigmented cells. This central necrosis, which appears to have begun in the true corneal tissue and spread forward until the slough separated and perforation and prolapse followed, is sharply limited on either side, beyond which the cornea is quite free from inflammatory infiltration. As the periphery of the cornea is reached we find the epithelial layer and overlying conjunctiva much swollen and separated by collections of deeply-stained small cells, which have also invaded the corneal tissue, in places massed in pit-like depressions—evidently the earlier stages of

abscesses. These lesions do not penetrate the entire thickness of the cornea, and beyond them, passing inward, comparatively healthy tissue remains. Immediately in the neighborhood of, and surrounding the entrance to Schlemm's canal, there is a collection of small round cells apparently extending directly into the lumen of this sinus. Following the iris from the position of its prolapse toward the ciliary body, this is seen to be swollen, inflamed, and infiltrated with inflammatory cells, a condition which repeats itself in the ciliary body. Of special interest are the vessels in these structures, particularly in the latter. They present one of the forms of obliterating arteritis. Taking as the type one of the small ciliary arterioles, it reveals in cross-section the following characteristics: An asymmetrically placed lumen out of proportion to the size of the vessel; unusually prominent endothelial plates pushing their way into the central aperture, bounded externally by badly-stained fibrous elements which have practically substituted the middle coat still visible in the periphery as a narrow circle of poorly-developed muscular fibres, beyond which the indefinite tissue of the adventitia is apparent. The condition is analogous to that which has been described under the term *mesarteritis*. The choroid, retina, and optic nerve are free from disease. The ciliary nerves, where they pass through the sclerotic coat, were carefully sought out, but do not present in the carmine sections any evidence of inflammation or infiltration, and in those stained by Weigert's method any sign of degeneration. Their reaction to these reagents was in all particulars such as is seen in nerves of normal constitution. The principal appearances as found microscopically are, hence: a sharply-defined, nearly central slough of the cornea, separated by nearly normal corneal tissue from a peripherally-situated, secondary keratitis having inflammatory connection with overlying diseased conjunctiva, but bounded below by reasonably-healthy cornea; small-celled infiltration surrounding Schlemm's canal; inflamed iris and ciliary body, through which tissues the arterioles present a form of arteritis of the type known as mes-

arteritis; normal choroid, retina, and optic nerve; and *unaffected ciliary nerves.*

The keratitis present in the eye under consideration, apart from its etiology, is interesting on account of its apparent mode of development. It bears a strong resemblance to the type described by Senftleben (*Virchow's Archiv*, Bd. 65, p. 69), and which he produced in animals in whom the trigeminus had been divided. Under these circumstances this investigator found that the primary affection of the cornea appeared as a necrosis originated by the repeated traumatisms which the eye encountered owing to its anæsthesia. This circumscribed necrosis of the cornea then acted as a seat of inflammatory irritation, and brought into existence a secondary keratitis proceeding from the periphery of the membrane. The obliterating arteritis evident in the vessels of the ciliary body, in the study of which I have had the advantage of the assistance of Dr. Meigs, presents an inviting opportunity to build a theory in regard to the etiology of neuro-paralytic keratitis. As, however, was originally pointed out by C. Friedländer (*Centralblatt f. die med. Wissenschaft*, 1876, p. 69), *arteritis obliterans* is found in specimens from clinical and experimental phthisis, in tumors, and in chronic inflammations, especially if accompanied by tuberculosis, an observation which Dr. Meigs has confirmed in his study of the vessels in so-called chronic Bright's disease. The existence, then, of this lesion in the present instance is to be explained as the result of a chronic inflammation, and in no sense as a cause of its existence. The entire absence of disease of the ciliary nerves is a noteworthy fact, and demonstrates that, although the nuclei of the fifth pair were affected, there was no degeneration or inflammation in the course or peripheral distribution of this nerve.

It may be interesting briefly to refer to the various theories which, from time to time, have been advanced to explain the existence of neuro-paralytic keratitis. The earlier experimenters—Magendie, Claude Bernard, and von Graefe—maintained that the destructive changes in the eye were largely due to the section of a trophic nerve. Snellen concluded that the

disease was nothing more than a traumatic inflammation provoked by the presence of undetected injuries and foreign bodies. Schiff, noticing that section was followed by paralysis of the nerves of the vessels, together with widening of their calibre, and, later, inflammation, relegated the cause to the nerve itself through a vasomotor influence, but later modified this opinion by stating that a neuro-paralytic hyperæmia was conditioned by the development of an inflammation stirred up by outside influences. The experiments of Samuel, Buettner, Meissner, Eckhard, and others gave rise to the trophic-traumatic theory, Meissner especially holding that the inner fibres of the nerve are more important in the trophic influence than any others. According to Buettner and Meissner, the division of these fibres deprived the eye of its capacity to resist external influences. Among other theories is that one elaborated by Eberth, in which a mycotic influence was invoked to explain the disease. The pure traumatic theory, developed originally by Snellen, has found many advocates, notably Senftleben and von Gudden. The most recent elaborate work upon this subject is by E. von Hippel (*Archiv f. Ophthalmologie*, Bd. xxxv. 2, p. 217), from whose paper I have abstracted the facts just quoted. This author cannot accept the presence of medially-placed trophic fibres in the trigeminus; believes the pure traumatic theory to be untenable; denies the existence of an impaired power of resisting traumatisms on the part of the affected eye, which, however, is more exposed, on account of the anæsthesia, to desiccation than is the case with a normal one; rejects microörganisms as etiological factors; and holds that the theory of increased evaporation is sufficient to explain the development of the inflammation, showing experimentally how a moist atmosphere can prevent the disease.

## DISCUSSION.

Dr. H. A. Hare: If the experiments with toxic doses of quinine be repeated on albino rabbits, it will be found that as the effect of the quinine becomes manifest the eyes will lose their pink color and become pale. If these rabbits are opened immediately after death, coagulated blood will be found in numbers of the bloodvessels, particularly the cerebral and those about the head. The finer capillaries seem as though they were contracted. Briquet, myself, and one or two others who have experimented with poisonous doses of quinine on the lower animals, have noted that the blood coagulates with great rapidity. It gives up its serum very slowly with the formation of an exceedingly firm clot. It is iridescent on the surface, and has the consistence of calves'-foot jelly. In no case was the blood liquid and disorganized, as has been asserted to be the case by some German observers.

Dr. Edward Jackson: As Dr. de Schweinitz read his paper it struck me that the results of his experiments, in so far as they have given positive results, point strongly toward the general influence on the circulation. If we take only the symptoms referable to the organs of vision, we have narrowing of the retinal vessels and pallor of the disk. We must remember that the blood-supply to the disk is distinct from that to the retina, so that this means the involvement of distinct parts of the vascular system. Considering that these symptoms form only a part of a much larger group arising in these experiments, it seems to me that what weight they have—and they are certainly of great interest, and of weight where there is so little of positive knowledge—is in the direction of an effect upon the circulation, and not of a specific influence on any particular portion of the nervous system.

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